

APPENDIX 5: LEVEL 1 FAUNA SURVEY OF THE GRUYERE GOLD PROJECT BOREFIELDS (HAREWOOD 2016)

Fauna Assessment (Level 1)



Gruyere Borefield Project Gold Road Resources Limited

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Version 3

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Acronyms/Abbreviations:

BA: Birdlife Australia (Formerly RAOU, Birds Australia).

BC Bill: *Biodiversity Conservation Bill* (2015). WA Government.

CALM: Department of Conservation and Land Management (now DPaW), WA Government.

CAMBA: China Australia Migratory Bird Agreement 1998.

DEC: Department of Environment and Conservation (now DPaW), WA Government.

DEH: Department of Environment and Heritage (now DoE), Australian Government.

DEP: Department of Environment Protection (now DER), WA Government.

DEWHA: Department of the Environment, Water, Heritage and the Arts (now DoE), Australian Government.

DER: Department of Environment Regulation (formerly DEC, DoE), WA Government.

DMP: Department of Mines and Petroleum (formerly DoIR), WA Government.

DoE: Department of Environment (now DER/DPaW), WA Government.

DoIR: Department of Industry and Resources (now DMP), WA Government.

DotE: Department of the Environment (formerly SEWPaC, DWEHA, DEH), Australian Government.

DPaW: Department of Parks and Wildlife (formerly DEC, CALM, DoE), WA Government.

EP Act: *Environmental Protection Act 1986*, WA Government.

EPA: Environmental Protection Authority, WA Government.

EPBC Act: *Environment Protection and Biodiversity Conservation Act 1999*, Australian Government.

ha: Hectare (10,000 square metres).

IBRA: Interim Biogeographic Regionalisation for Australia.

IUCN: International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union.

JAMBA: Japan Australia Migratory Bird Agreement 1981.

km: Kilometre (1,000 metres).

OEPA: Office Environmental Protection Authority, WA Government.

RAOU: Royal Australia Ornithologist Union.

ROKAMBA: Republic of Korea-Australia Migratory Bird Agreement 2007.

SEWPaC: Department of Sustainability, Environment, Water, Population and Communities (now DotE, formerly DEH, DEWHA), Australian Government.

SRE: Short Range Endemic.

SSC: Species Survival Commission, International.

WA: Western Australia.

WAM: Western Australian Museum, WA Government.

WC Act: *Wildlife Conservation Act 1950*, WA Government.

SUMMARY

This report details the results of a Level 1 fauna assessment of the proposed Gruyere borefields project area being investigated as part of Gold Road Resources Limited's (GRRs) possible future gold project development in the "Yamarna Belt" tenement areas situated about 160km north-east of Laverton, Western Australia (Figure 1).

The borefield (and associated pipeline routes) are comprised of two main areas, one to the west of the main Gruyere Project area (Yeo Borefield) and one to the south east (Anne Beadell Borefield)(Figures 2 & 3). The area surveyed as part of this assessment covers approximately 5,983 ha.

The assessment was undertaken for the purposes of delineating and characterising the fauna habitats and faunal assemblages present in the target area. The assessment has included a desktop review and field reconnaissance survey (8 to 10 November 2015) carried out to comply with relevant EPA guidance statements.

Previous terrestrial invertebrate surveys undertaken within the Yamarna area indicate that it is possible that potential SREs could occur within the proposed borefield areas, given the proximity of the records acquired to date and the presence of similar habitat types.

A list of expected vertebrate fauna species likely to occur in the survey area was compiled from information obtained during the literature review and is presented in Appendix B. Observations made during the field survey and the results of some previous fauna surveys carried out in the general area are summarised in this species listing as are the DPaW NatureMap database search results.

With respect to native vertebrate fauna, 28 mammals (including eight bat species), 103 bird, 105 reptile and nine frog species have previously been recorded in the general area, some of which have the potential to occur in or utilise at times, the survey area.

The broad scale terrestrial fauna habitats within the survey area presented below are based primarily on landforms identified by Botanica (2015) with further often subtle subdivisions possible using vegetation structure. The extent of the identified broad scale fauna habitats within the survey area are shown in Figure 4 with a summary description of each given below.

- Clay-Loam Plains
Acacia Forests and Woodlands, *Acacia* Shrublands, Mallee Open Woodlands and Sparse Mallee Shrublands
Total Area = 172 ha (~2.9%).
- Closed Depressions
Acacia Forests and Woodlands, *Casuarina* Forests and Woodlands, Mallee Woodlands and Shrublands, Chenopod Shrublands, Samphire Shrublands and Forblands.
Total Area = 266 ha (~4.4%)

- Drainage Depressions
Acacia Forests and Woodlands, Acacia Open Woodlands, Mallee Woodlands and Shrublands.
Total Area = 163 ha (~2.7%)
- Quartz/Rocky Plains
Acacia Forests and Woodlands, Casuarina Forests and Woodlands, Mallee Woodlands and Shrublands.
Total Area = 335 ha (~5.6%)
- Sand Dunes
Eucalypt Woodlands, Mallee Woodlands and Shrublands.
Total Area = 252 ha (~4.2%)
- Sand-Loam Plains
Acacia Forests and Woodlands, Regrowth, modified native vegetation.
Total Area = 256 ha (~4.3%)
- Sandplains
Acacia Forests and Woodlands, Eucalypt Woodlands, Mallee Woodlands and Shrublands, Regrowth, modified native vegetation.
Total Area = 4,539 ha (~75.9%).

Opportunistic fauna observations are listed in Appendix B. A total of 56 native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) within the survey area over the three day survey period. Observations of four introduced species using the survey area were also gathered.

A review of the EPBC Act threatened fauna list, DPAW's Threatened Fauna Database and Priority List, unpublished reports and scientific publications identified a number of specially protected, migratory or priority fauna species as having been previously recorded or as being potentially present in the general vicinity of the survey area.

Of these species, those that have no potential whatsoever to utilise the study area for any purpose have been omitted from the potential list for the site (Appendix B), principally due to available information suggesting the survey area is outside of their current documented range, lack of suitable habitat on-site (including extent and/or quality) or known local/regional extinction.

Two vertebrate fauna species of conservation significance (listed under State or Federal threatened/migratory species lists or as a DPaW priority species) were positively identified as utilising the study area for some purpose during the survey period, this being:

- **Rainbow Bee-eater *Merops ornatus* – Migratory (EPBC Act), S5 (WC Act)**
Observed/heard on several occasions during survey period. The rainbow bee-eater is a very common and widespread seasonal visitor to the southern half of WA and would not be specifically attracted to the site. Some potential for the species to breed in some sections of the survey area where ground conditions

are suitable. Population levels would however not be significant as it usually breeds in pairs and rarely in small colonies (Johnstone and Storr, 1998).

Extent of potential habitat within the survey area: Foraging habitat - sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains (5,983 ha – 100% of total area). Breeding habitat - sand plains and sand dunes (4,791 ha - ~80.1% of total area).

- **Southern Marsupial Mole *Notoryctes typhlops* – P4 (DPaW Priority Species)**

The distinctive backfilled burrows of this species were found in the walls of a temporary holding dam constructed on a sand dune in the extreme northern section of the proposed Yeo Borefield, north of the Great Central Road (Figure 2), confirming this species presence at this particular area. This area of dunes appears to be separate from those in other sections of Yamarna (e.g. Gruyere mine area) where no evidence of the species has been found despite targeted searches (i.e. trenches and examination of large cutting in dunes) (Harewood 2015a).

Extent of potential habitat within the survey area: Sand dunes in the northern section of the western borefield, mainly north of the Great Central Road (33 ha – ~0.6% of total area).

The current status on site and/or in the general area of some other species is difficult to determine, however, based on the habitats present and, in some cases, recent nearby records, six additional species of conservation significance can be regarded as possibly utilising the survey area for some purpose at times, these being:

- **Buff-snouted Blind Snake *Anilius margaretae* – P2 (DPaW Priority Species)**

The status of this species in the survey area is difficult to determine. Given suitable habitat (i.e. sand dunes and sand plains) occurs its presence cannot be discounted despite not being recorded during previously fauna surveys nearby and in the wider area (ecologia 2009, KLA 2012, KEC 2014 and Rapallo 2015). While there are limited records for this species, it appears to have a wide distribution across the Great Victoria Desert. The lack of records could be attributed to the areas remoteness and the secretive habits of blind snakes and it may in fact be more common than records indicate.

Extent of potential habitat within the survey area: Sand plains and sand dunes (4,791 ha - ~80.1% of total area).

- **Malleefowl *Leipoa ocellata* – S3 (WC Act), Vulnerable (EPBC Act)**

No evidence of this species (individuals, foot prints, feathers or recent/old nest mounds) was observed during the survey period. Habitat appears unsuitable or at best marginal within much of the area surveyed primarily due to the generally sparse nature of the vegetation, recent fires and/or a lack of leaf litter.

Individual malleefowl have very occasionally been observed in the general vicinity of Yamarna (pers. comms. “Driller” and TOs) but no recent active or inactive mounds have ever been recorded despite several fauna and flora surveys over significant areas of land associated with the proposed mining operations. This would suggest that the habitats present are unsuitable for breeding and that the observations made are of transient individuals.

For these reasons malleefowl have been listed as a potential species due to the possibility for occasional transient individuals to occur, but they are considered very unlikely to breed within the borefield area itself.

Extent of potential habitat within the survey area: Vegetated clay loam plains, sand loam plains, drainage depressions and quartz rocky plains (926 ha - ~15.5% of total area). Most habitat does however appear marginal in quality at best.

- **Peregrine Falcon *Falco peregrinus* – S7 (WC Act)**

The species potentially utilises some sections of the survey area as part of a much larger home range for foraging purposes only. Would only be represented by a very small number of individuals for limited periods. Previously recorded at Tropicana (ecologia 2009).

Extent of potential habitat within the survey area: Foraging habitat - sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains (5,983 ha – 100% of total area). Breeding habitat - Large trees with open spouts suitable for nesting or abandoned bird of prey nests – total number unknown, but none observed during field survey.

- **Princess Parrot *Polytelis alexandrae* – Vulnerable (EPBC Act), P4 (DPaW Priority Species)**

The species may frequent the survey area at times, but given it is highly nomadic, its frequency of occurrence would be very low and generally temporary. Areas containing *Euclayptus gongylocarpa* woodland are of most significance as they have the potential to contain larger trees with hollows that may represent potential breeding habitat.

Extent of potential habitat within the survey area: Foraging habitat - Vegetated sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains (5,983 ha – 100% of total area). Breeding habitat - Large trees with hollows suitable for nesting – total number, if any, unknown.

- **Striated Grasswren (sand plain) *Amytornis striatus striatus* - P4 (DPaW Priority Species)**

Not observed during the field survey or during any other recent survey at Yamarna however there is a NatureMap record along the Anne Beadell Highway just east of the borefield survey area made in the year 2000 (DPaW

2015b) and therefore it is considered to be a potential species where suitable habitat occurs. This species has also been recorded recently much further south at several locations along the Tropicana to Sunrise Dam pipeline route (KEC 2014).

Extent of potential habitat within the survey area: Sand plains, sand dunes, clay loam plains and sand loam plains (5,047 ha – 84.4% of total area).

- **Brush-tailed Mulgara *Dasyercus blythi* - P4 (DPaW Priority Species)**

There is a paucity of records of this species in the area and no evidence of its presence was observed during the field survey or any previous survey at Yamarna including those where trapping has been employed (KLA 2012 and Rapallo 2015). The current status in the survey area is therefore difficult to determine. The most recent nearby records are just south west of Yamarna from 1990 (DPaW 2015) and it was also recorded at several locations along the Tropicana to Sunrise Dam pipeline route (KEC 2014). This information coupled with the fact that habitat in some sections of the survey area appears suitable (e.g. sand plains, sand ridges, *Acacia* shrubland on loamy sand) suggests that the species may be present in some areas..

Extent of potential habitat within the survey area: Sand plains, sand dunes, clay loam plains and sand loam plains (5,047 ha – 84.4% of total area).

It should be recognised that habitat within the survey area for some of the species listed above, while considered possibly suitable, may be marginal in extent/quality and the species listed may therefore only visit the area for short periods or as rare/uncommon vagrants.

Additional details on these species and others along with reasons for the omission of some from the potential listing are provided in Table 3 and Appendix D.

Based on available information it has been concluded that no terrestrial invertebrate or vertebrate fauna species of significance are unlikely to be significantly impacted on by installation and operation of a borefield. Given the relatively small size of the impact footprint at any one point, the linear nature of pipeline routes and the extensive habitat connectivity with adjoining areas impacts on fauna and fauna habitat at any one point are anticipated to be small/negligible and therefore manageable.

The following proposed fauna management recommendations are considered most important and while likely to form part of existing procedures and protocols should be made a priority during borefield construction and operation and should be taken into consideration if considered relevant and reasonable/practicable to implement. These recommendations are not necessarily exhaustive and others may need consideration after consultation with relevant regulatory authorities.

It is recommended that:

- Planning for development should aim to minimise as much as possible the area of remnant vegetation requiring removal. Existing cleared areas/tracks should be used in preference to clearing additional areas.
- In particular impact to areas of woodland (e.g. *Eucalyptus gongylocarpa*) should be avoided if possible and in particular those specimens containing existing hollows should be a priority for retention. Sand dunes, particularly in the northern section of the western borefield area should also be avoided if possible.
- During site works, areas requiring clearing should be clearly marked and access to other areas restricted to prevent accidental clearing of areas to be retained. Unauthorised off-track driving and parking should be prohibited.
- No dead, standing or fallen timber should be removed unnecessarily. Logs (hollow or not) and other debris resulting from land clearing should be used to enhance fauna habitat in untouched and rehabilitated areas if possible.
- Cleared areas should be rehabilitated as soon as is practicable. Monitoring of rehabilitated areas should be carried out and included weed management.
- A Construction and Operations Fire Management Plan should be prepared to reduce the risk of unplanned fires and provide contingency measures to minimise any associated impacts. The plan will include a contingency and response plan in the event of any bushfires that commence as a result of the works on site.
- All staff working on site should be made aware that native fauna is protected. Personnel working on the project should not be allowed to bring firearms, other weapons or pets onsite. Personnel should be discouraged from feeding native and introduced fauna.
- Infrastructure should be positioned to avoid or minimise the disruption to surface and sub-surface hydrology where possible. Levees and drains designed to mimic natural drainage flows should be incorporated in plans where disruptions may occur.
- Any holes, pits or trenches should be kept open for only as long as necessary and suitable escape ramps (45° batter) and bridging provided if the site is to be left unattended for extended periods. Any manmade holes, pits or trenches likely to trap animals should be inspected immediately prior to filling.

1. INTRODUCTION

This report details the results of a Level 1 fauna assessment of the proposed Gruyere borefields project area being investigated as part of Gold Road Resources Limited's (GRRs) possible future gold project development in the "Yamarna Belt" tenement areas situated about 160km north-east of Laverton, Western Australia (Figure 1).

The borefield (and associated pipeline routes) are comprised of two main areas, one to the west of the main Gruyere Project area (Yeo Borefield) and one to the south east (Anne Beadell Borefield)(Figures 2 & 3). The area surveyed as part of this assessment covers approximately 5,983 ha.

It is understood that information obtained during this assessment will be used in conjunction with other environmental investigations to guide project planning. It is anticipated that the information presented will also be used by regulatory authorities to assess the potential impact of the proposal on fauna and fauna habitats at the site during the project evaluation and approval process.

2. SCOPE OF WORKS

The scope of works was to carry out a fauna assessment which complies with the requirements of a Level 1 terrestrial fauna survey as defined in EPA Guidance Statement 56 (EPA 2004), this being:

- Background research or 'desktop' survey

The purpose is to gather background information on the target area (usually at the locality scale). This involves a search of all sources for literature, data and map-based information.

- Reconnaissance survey

The purposes are:

- i) to verify the accuracy of the background survey;
- ii) to further delineate and characterise the fauna and faunal assemblages present in the target area; and
- iii) to identify potential impacts.

The reconnaissance survey involves a site visit by suitably qualified personnel to undertake selective, low intensity sampling of the fauna and

faunal assemblages, and to provide habitat descriptions and habitat maps of the project area (EPA 2004).

3. RELEVANT LEGISLATION

In Western Australia, all fauna are protected by legislation as defined under three government acts:

- *Wildlife Conservation Act (1950) (WA) (WC Act)*;
- *Environmental Protection Act (1986) (WA) (EP Act)*; and
- *Environment Protection and Biodiversity Conservation Act (1999) (Commonwealth) (EPBC Act)*.

The *Wildlife Conservation Act 1950* provides protection for all native fauna species, and is administered by DPaW. Special provision is provided for fauna that are considered rare, threatened with extinction or of high conservation value.

It should be noted that the *Wildlife Conservation Act (1950)* is soon to be repealed and replaced by the *Biodiversity Conservation Bill (2015)* currently before Parliament.

The *Environmental Protection Act (1986)* is administered by the Environmental Protection Authority (EPA) and includes guidelines for reviewing the aspects of proposals that might significantly impact environmental factors. Any operation that has the potential to significantly impact on fauna habitat of potential conservation significance may be subject to formal Environmental Impact Assessment (EIA) under the *EP Act*.

The *Environment Protection and Biodiversity Conservation Act (1999)* is administered by the Commonwealth Department of the Environment, to regulate protection of matters of national environmental significance. Any action (including projects, developments, undertakings, activity or series of activities) that is likely to have a significant impact on any matter included in Part 3 of the Act, must be referred to the Minister for decisions on whether the proposed action triggers the *EPBC Act* and requires assessment and approval under the Act.

Formal environmental impact assessment (EIA) under the *Environmental Protection Act 1986* is therefore likely to be required if a proposal may cause significant change to a habitat containing fauna of conservation significance.

4. METHODS

4.1 POTENTIAL VERTEBRATE FAUNA INVENTORY - DESKTOP SURVEY

4.1.1 Database Searches

Searches of the following databases were undertaken to compile a list of vertebrate fauna potentially occurring within the survey area:

- Department of Parks and Wildlife's (DPaW's) NatureMap Database (combined data from DPAW, Western Australian Museum and Birds Australia) (DPAW 2015b); and
- Protected matters search tool (Department of the Environment - DotE 2015b).

It should be noted that these lists are based on observations from a broader area than the survey site and therefore may include species that would only ever occur as vagrants in the actual survey area due to a lack of suitable habitat or the presence of only marginal habitat. The databases also often included very old records and in some cases the species in question have become locally or regionally extinct.

Information from these sources should therefore be taken as indicative only and local knowledge and information needs also to be taken into consideration when determining what actual species may be present within the specific area being investigated.

4.1.2 Previous Fauna Surveys in the Area

Fauna surveys, assessments and reviews have been undertaken in nearby areas in the past, though not all are publically available and could not be referenced. The most significant of those available have been used as the primary reference material for compiling the potential fauna assemblage for the general area. Those reports referred to included, but were not limited to:

- ecologia (2009a). Tropicana Gold Project. Operational Area Vertebrate Fauna Assessment. Unpublished report for Tropicana Joint Venture. February 2009.
- ecologia (2009b). Tropicana Gold Project. Tropicana-Transline Infrastructure Corridor, Level 1 Fauna Assessment. Unpublished report for Tropicana Joint Venture. July 2009.

- Hall, N. J., McKenzie, N. L. and Keighery, G. J. (eds) (1994). The Biological Survey of the Eastern Goldfields of WA - Pt 10: Sandstone-Sir Samuel and Laverton-Leonora Survey Areas. Records of the WAM, Supplement 47: 1 – 166.
- Harewood, G. (2011). Terrestrial Fauna Survey (Level 1) of Yamarna Gold Project (Central Bore, Attila, Alaric, Haul Road and Khan North). Unpublished report for Gold Road Resources. September 2011.
- Harewood G. (2014). Fauna Assessment (Level 1) Gruyere Project. Unpublished report for Gold Road Resources Ltd. July 2014.
- Kingfisher Environmental Consulting (2014a). Murrin Murrin – Sunrise Dam Infrastructure Corridor Level 1 Fauna Survey. Unpublished report for AngloGold.
- Kingfisher Environmental Consulting (2014b). Sunrise Dam – Tropicana Infrastructure Corridor Level 1 Fauna Survey. Unpublished report for AngloGold.
- KLA (2012). Fauna Assessment (Level 2) Yamarna Project. Unpublished report for Gold Road Resources. October 2012.
- Martnick and Associates Pty Ltd (1996). Environmental Appraisal – Yamarna Gold Project Area. Unpublished report for Zanex NL. January 1996.
- MBS Environmental (2014). Gruyere Project - Desktop Environmental Review and Work Program. Unpublished report for Gold Road Resources. February 2014.
- Ninnox Wildlife Consulting (2009). A Level One Survey of the Vertebrate Fauna, Infrastructure Corridor – Pinjin Option. L 31/57, L 39/185, Pinjin – Tropicana Gold Project. Unpublished report for Tropicana Joint Venture. January 2009.
- Rapallo Environmental (2015). Fauna Survey of the Gruyere Project Area. Unpublished report for Gold Road Resources Limited. May 2015.
- Terrestrial Ecosystems (2011). Level 2 Fauna Risk Assessment for the Granny Deeps Project Area. Unpublished report. February 2011.

Some of the abovementioned reports refer to fauna surveys carried a considerable distance from the survey area being assessed and therefore, as with the databases searches, some refer to species that would not occur in the survey area due it being out of their normal range or due to a lack of suitable habitat (extent and/or quality) and this fact was taken into consideration when

compiling the potential fauna species list for the survey area. It should also be noted that the NatureMap database is likely to include some records from previous fauna surveys in the area including some of those listed above.

4.1.3 Existing Publications

The following represent the main publications used to identify and refine the potential fauna species list for the survey area:

- Anstis, M. (2013). Tadpoles and Frogs of Australia. New Holland Publishers, Sydney.
- Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulter, R. (2003). The New Atlas of Australian Birds. Royal Australasian Ornithologists Union, Victoria.
- Churchill, S. (2008). Australian Bats. Second Edition, Allen & Unwin.
- Johnstone, R.E. and Storr, G.M. (1998). Handbook of Western Australian Birds: Volume 1 – Non-passerines (Emu to Dollarbird). Western Australian Museum, Perth Western Australia.
- Johnstone, R.E. and Storr, G.M. (2004). Handbook of Western Australian Birds: Volume 2 – Passerines (Blue-winged Pitta to Goldfinch). Western Australian Museum, Perth Western Australia.
- Menkhorst, P. and Knight, F. (2011). A Field Guide to the Mammals of Australia. Third Edition, Oxford University Press, Melbourne.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1983). Lizards of Western Australia II: Dragons and Monitors. WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1990). Lizards of Western Australia III: Geckos and Pygopods. WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1999). Lizards of Western Australia I: Skinks. Revised Edition, WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (2002). Snakes of Western Australia. Revised Edition, WA Museum, Perth.
- Thompson, S. & Thompson, G. (2006). Reptiles of the Western Australian Goldfields. Published by the Goldfields Environmental Management Group.
- Tyler M.J. & Doughty P. (2009). Field Guide to Frogs of Western Australia, Fourth Edition, WA Museum, Perth.

- Van Dyck, S., Gynther, I. & Baker, A. Eds (2013). Field Companion to The Mammals of Australia. Queensland Museum.
- Wilson, S. and Swan, G. (2013). A Complete Guide to Reptiles of Australia. Third Edition, Reed, New Holland, Sydney.

4.1.4 Fauna of Conservation Significance

The conservation significance of fauna species has been assessed using data from the following sources:

- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. Administered by the Australian Government Department of the Environment (DotE);
- *Wildlife Conservation Act 1950 (WC Act)*. Administered by the Western Australian Department of Parks and Wildlife (DPaW) (Govt. of WA 2015);
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List - the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and the
- DPaW Priority Fauna list. A non-legislative list maintained by DPaW for management purposes (DPaW 2015a).

The *EPBC Act* also requires the compilation of a list of migratory species that are recognised under international treaties including the:

- Japan Australia Migratory Bird Agreement 1981 (JAMBA);
- China Australia Migratory Bird Agreement 1998 (CAMBA);
- Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA); and
- Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals).

(Note - Species listed under JAMBA are also specially protected under Schedule 5 of the *WC Act*.)

All migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as matters of national environmental significance (NES) under the *EPBC Act*.

The conservation status of all vertebrate fauna species listed as occurring or possibly occurring in the vicinity of the Project area has been assessed using the

most recent lists published in accordance with the above-mentioned instruments and is indicated as such in the fauna listings of this report. A full listing of conservation codes is provided in Appendix A.

4.1.5 Likelihood of Occurrence – Vertebrate Fauna of Conservation Significance

For vertebrate fauna of conservation significance identified during the literature review as previously being recorded in the general area, each was assessed and ranked for their likelihood of occurrence within the survey area itself. The rankings and criteria used were:

- **Unlikely to Occur:** Survey area is outside of the currently documented distribution for the species in question or the species is generally accepted as being locally/regionally extinct (supported by a lack of recent records), or no suitable habitat (type, quality and extent) was identified as being likely to be present during the field survey and literature review. Individuals of some species may occur very occasionally as vagrants/transients especially if suitable habitat is located nearby but the survey area itself would not support a population or part population of the species.
 - **Locally Extinct:** Populations no longer occur within a small part of the species natural range, in this case within 10 or 20km of the survey area. Populations do however persist outside of this area.
 - **Regionally Extinct:** Populations no longer occur in a large part of the species natural range, in this case within the Goldfields region, Populations do however persist outside of this area.
- **Possibly Occurs:** Survey area is within the known distribution of the species in question and habitat of at least marginal quality was identified as being likely to be present during the field survey and literature review, supported in some cases by recent records being documented in literature from within or near the survey area. In some cases, while a species may be classified as possibly being present at times, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.
- **Known to Occur:** The species in question was positively identified as being present (for sedentary species) or as using the survey area as habitat for some other purpose (for non-sedentary/mobile species) during the field survey. This information may have been obtained by direct observation of individuals or by way of secondary evidence (e.g. tracks, foraging debris, scats). In some cases, while a species may be classified as known to occur, habitat may be marginal (e.g. poor quality,

fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

4.1.6 Taxonomy and Nomenclature

Taxonomy and nomenclature for vertebrate fauna species used in this report is generally taken from the DPAW's WA Fauna Census Database which is assumed to follow Aplin and Smith (2001) for amphibians and reptiles and Johnstone (2001) for birds. Jackson and Groves (2015) has been used for mammals.

Common names are taken from the Western Australia Museum (WAM) recognised primary common name listings when specified, though where common names are not provided they have been acquired from other publications. Sources include Cogger (2014), Wilson and Swan (2013), Van Dyck *et al.* (2013), Christidis and Boles (2008), Bush *et al.* (2007), Bush *et al.* (2002), Tyler *et al.* (2000) and Glauret (1961). Not all common names are generally accepted.

4.2 INVERTEBRATE FAUNA OF CONSERVATION SIGNIFICANCE

It can be difficult to identify what may be significant invertebrate species (e.g. Short Range Endemics - SREs) as there are uncertainties in determining the range-restrictions of many species due to lack of surveys, lack of taxonomic resolutions within target taxa and problems in identifying certain life stages. Where invertebrates are collected during surveys, a high percentage are likely to be unknown, or for known species there can be limited knowledge or information on their distribution (Harvey 2002).

The review of potential terrestrial invertebrate species of conservation significance has included a search of the DPaW NatureMap database (DPaW 2015b) and the DotE protected matters database (DotE 2015) with the aim of identifying previously recorded threatened and endemic species.

These sources do however have limitations and therefore the results and conclusions of several terrestrial short range endemic studies carried out previously within GRRs Yamarna tenements/Project areas have also been used as a reference in determining the likelihood of terrestrial invertebrate species of conservation significance being impacted on by the installation and operation of the borefield itself. The reports have included:

- Burger, M., Castalanelli, M.A and Harvey M.S. (2012). Arachnids from Yamarna, 140 km East of Laverton, Western Australia. Report to Keith Lindbeck and Associates by Western Australian Museum. May 2012.

- Judd, S. (2015). Terrestrial Isopod Identification for Dorothy Hills, Yamarna Station. Unpublished report prepared for Greg Harewood (on behalf of GRRs). November 2015.
- Phoenix Environmental Sciences (2014). Identification and assessment of short-range endemism of trapdoor spiders from Yamana [sic] Station, Western Australia. Unpublished report prepared for Botanica Consulting.
- Phoenix Environmental Sciences (2015a). Identification and assessment of short-range endemism of invertebrates from Yamarna Station, Western Australia. Unpublished report prepared for Rapallo Ltd.
- Phoenix Environmental Sciences (2015b). Identification and assessment of short-range endemism of trapdoor spiders from Gruyere Project (Yamarna Station), Western Australia. Unpublished report prepared for Greg Harewood (on behalf of GRRs). November 2015.
- Volschenk, E. (Scorpion ID) (2012). Yamarna Scorpion Identification Report. Unpublished report for Keith Linbeck and Associates.
- Volschenk, E. (Scorpion ID) (2015a). Taxonomic Report for Invertebrates Surveyed from Yamarna Station. Unpublished report prepared for Rapallo Ltd.
- Volschenk, E. (Scorpion ID) (2015b). Taxonomic and Short-Range Endemism Assessment of Invertebrates Surveyed from Yamarna Station (November 2015). Unpublished report prepared for Greg Harewood (on behalf of GRRs). November 2015.

4.3 SITE SURVEYS

The survey area was assessed between the 8 and 10 November 2015. All survey work was carried out by Greg Harewood (B.Sc. Zoology) with some assistance from staff of Botanica Consulting and the Yilka Traditional Owners (including but not limited to Harvey Murry (HM) and Harvey Murry Junior (HJ)).

4.3.1 Habitat Assessment

Landforms and vegetation units identified during the flora and vegetation survey, carried out by Botanica Consulting (2015) have been used to define broad fauna habitat types across the site. This information has been supplemented with observations made during the site survey.

The main aim of the habitat assessment was to determine if it was likely that any species of conservation significance would be utilising the areas that maybe impacted as a consequence of the proposal proceeding. The habitat information obtained was also used to aid in finalising the overall potential fauna list.

As part of the literature review, available information on the habitat requirements of the species of conservation significance listed as possibly occurring in the area was researched. During the field survey the habitats within the survey area were assessed and specific elements identified, if present, to determine the likelihood of listed threatened species utilising the area and its significance to them.

4.3.2 Opportunistic Fauna Observations

Opportunistic observations of fauna species were made during the field survey work which involved a series of transects across/along the defined survey area while searching microhabitats such as logs, rocks, leaf litter and observations of bird species with binoculars.

Secondary evidence of a species presence such as tracks, scats, skeletal remains, foraging evidence or calls were also noted if observed/heard.

The opportunity was also taken to examine the walls of a temporary water holding dam constructed on a sand dune in the northern section of the survey area for evidence (backfilled tunnels) of marsupial moles (see Figure 2 for location).

5. SURVEY CONSTRAINTS

The conclusions presented are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of the field assessments. Also it should be recognised that site conditions can change with time. No seasonal sampling has been carried out as part of this fauna assessment.

Some fauna species are reported as potentially occurring within the survey area based on there being suitable habitat (quality and extent) within the survey area or immediately adjacent.

The habitat/microhabitat requirements and ecology of many of the species known to occur in the wider area are often not well understood or documented. It can therefore be difficult to exclude species from the potential list based on a lack of a specific habitat or microhabitat within the survey area. As a consequence of this limitation the potential fauna list produced is most likely an overestimation of those species that actually utilise the survey area for some purpose. Some species may be present in the general area but may only use the survey area itself on rare occasions or as vagrants.

In recognition of survey limitations, a precautionary approach has been adopted for this assessment. Any vertebrate fauna species that would possibly occur

within the survey area (or immediately adjacent), as identified through ecological databases, publications, discussions with local experts/residents and the habitat knowledge of the Author, has been assumed to potentially occur in the survey area.

6. RESULTS

6.1 POTENTIAL VERTEBRATE FAUNA INVENTORY

A list of expected vertebrate fauna species likely to occur in the survey area was compiled from information obtained during the literature review and is presented in Appendix B. Observations made during the field survey and the results of some previous fauna surveys carried out in the the general area are summarised in this species listing as are the DPaW NatureMap database search results. The raw database search results from NatureMap (DPaW 2015b) and the Protected Matters Search Tool (DotE 2015b) are contained within Appendix C.

6.2 INVERTEBRATE FAUNA OF CONSERVATION SIGNIFICANCE

The NatureMap database search of the survey area returned 65 invertebrate species records (DPaW 2015b) none of which are listed as threatened or as priority species. One species (*Wandella stuartensis* - a spider) is shown as being “Endemic to Query Area” (i.e. those DPaW species records that are wholly contained within the search area) but this species is also known from several locations in the eastern states (ALA 2015) and therefore it is not likely to be an SRE.

No other invertebrate species listed in the NatureMap search were flagged as being endemic to the query area which indicates that there are other records of each of these species, within the NatureMap database, outside the 40km (~5,000 km²) search area, suggesting none would be classified as SREs though this assessment has limitations.

A search of the federal *EPBC Act* database using the Protected Matters Search Tool (DotE 2015) returned no reference to invertebrates.

A search of the WAM databases for invertebrates was undertaken by MBS as part of their initial desktop review for the Gruyere Project (MBS 2014). The database search was based on a 20 km area and buffer respectively around a central coordinate, (-27.98669 S and 123.85007 E). The search results were limited to one potential SRE species being reported, a scorpion (*Urodacus* sp. 'Point Sunday') which was recovered from a borrow pit on Point Sunday Road in July 2007, approximately 11 km north of the central coordinate (MBS 2014). The individual record was a new and previously undescribed species.

During a Level 2 Fauna survey carried out at Yamarna in 2011 and 2012 (KLA 2012), 54 individual invertebrates were collected and passed onto specialists at the WAM. The assemblage comprised species from *Arachnida* and *Gastropoda*. Within the *Arachnida*, 10 species totalling 41 individuals representing six families within *Araneae*, *Pseudoscorpiones* and *Scorpiones* were identified. *Gastropoda* was represented by one Family and two species totalling 13 individuals.

Given the lack of taxonomic knowledge and reference collections, the results from the WAM were often inconclusive depending on the families or genera. Of the invertebrates identified, results indicated that seven species were not SREs or unlikely to be SREs, for three it was, at the time, not possible to say if the species represent an SRE and the remaining two required further taxonomic research in order to determine or confirm their SRE status. This highlights the lack of knowledge currently available in relation to the conservation status of many invertebrate species. It was concluded that not one specimen collected from the area was known to be a SRE (KLA 2012).

KLA (2012) also stated that in terms of potential SRE invertebrate habitat, while there are “no mountainous terrains and no free-standing areas of water within the tenements, the Yamarna area does support some breakaway areas and creeklines that may be considered SRE potential habitat” but that these areas were limited in extent in this particular area.

Two myglamorph spiders were collected within the Gruyere Project area during a Level 1 fauna survey carried out in May 2014 (Harewood 2014) and submitted to specialists for identification. The specimens included a male “trapdoor spider” identified as the widespread *Aganippe* ‘MYG159’ (family Idiopidae) and an unidentified juvenile spider belong to the family Theraphosidae (Australian tarantulas). Neither specimens were deemed to be SREs or potential SREs given their known or likely large distributions (Phoenix 2014).

During a Level 2 Fauna Survey within the Gruyere Project area carried out in late 2014 (Rapallo 2015) a total of 37 invertebrate specimens were collected. These comprised eight spiders, 27 scorpions, and two pseudoscorpions.

Taxonomic identifications (Phoenix 2015 and Volschenk 2015) revealed that the specimens contained six potential SRE species, comprising three species of Mygalomorph spider, and three species of scorpion. The pseudoscorpions were identified as being unlikely to represent SREs.

More recently, a targeted invertebrate survey has been completed within the Gruyere Project area between August and October 2015 (Harewood 2015). The survey included the deployment of 120 wet pit traps left in place for about two months and the collection and examination of 12 leaf litter samples. The survey yielded 249 specimens of SRE target groups (scorpions (59), isopods (59), pseudoscorpions (61), Mygalomorph spiders (10) and centipedes (60)).

The Mygalomorph spiders were identified as including four potential SREs and a widespread species (Phoenix 2015b). However, until material at the WA Museum (which is currently closed due to a major re-organisation of specimen storage) is available for comparative analysis, it will remain unclear if some of the specimens collected are conspecific with those previously collected in the area by KLA (2012) or Rapallo (2015) (i.e. if *Synothele* 'gruyere' is conspecific with *Synothele* sp. indet. (as reported in Burger *et al.* 2012) and if any of the *Aname* species is conspecific with *Aname* 'MYG250' (as reported in Burger *et al.* 2012) or *Aname* 'yamarna' (as reported in Phoenix 2015a)).

Other specimens collected included five species of scorpions, three species of pseudoscorpions, four species of scolopendromorph centipedes, one species of stone centipede and one species of earth centipede. Of these 14 species, two scorpions (*Lychas* 'annulatus complex' and *Urodacus* sp. indet), and the earth centipede (*Mecistocephalus* sp. indet.) were determined to be potential SRE's. The remaining 11 species were considered to have widespread ranges (Volschenk 2015b) and therefore not SREs.

The isopod specimens collected were determined to represent a single species that is considered to be a potential SRE primarily because there are knowledge gaps for the taxon and insufficient geographic information to determine its full distribution (Judd 2015).

To date no confirmed terrestrial SREs have been identified within the Yamarna area.

The results of the abovementioned surveys indicate that it is possible that potential SREs could occur within the proposed borefield areas, given the proximity of the records acquired to date and the presence of similar habitat types. Based on available information it is however concluded that terrestrial SRE invertebrates, even if present, are unlikely to be significantly impacted on by installation and operation of a borefield given the relatively small size of the impact footprint at any one point and the extensive habitat connectivity with adjoining areas. As a consequence there is a very low likelihood of any significant impact/change occurring to local invertebrate communities or to the conservation status of individual species given that populations will persist in adjoining unaffected locations.





6.3 SITE SURVEYS




6.3.1 Habitat Assessment

The broad scale terrestrial fauna habitats within the survey area presented below are based landforms and vegetation units identified by Botanica (2015). The extent of the vegetation complexes identified within the survey area are shown in Figures 4 with a summary description of each given below. Additional more detailed information of the various vegetation units present within each landform

can be found in the flora and vegetation report for the borefield areas (Botanica 2015).

Table 1: Main Terrestrial Fauna Habitats within the Survey Area.

No.	Fauna Habitat Description	Example Image
1	<p><u>Clay-Loam Plains</u></p> <p><i>Acacia</i> Forests and Woodlands, <i>Acacia</i> Shrublands, Mallee Open Woodlands and Sparse Mallee Shrublands</p> <p>Total Area = 172 ha (~2.9%)</p>	
2	<p><u>Closed Depressions</u></p> <p><i>Acacia</i> Forests and Woodlands, <i>Casuarina</i> Forests and Woodlands, Mallee Woodlands and Shrublands, Chenopod Shrublands, Samphire Shrublands and Forblands.</p> <p>Total Area = 266 ha (~4.4%)</p>	
3	<p><u>Drainage Depressions</u></p> <p><i>Acacia</i> Forests and Woodlands, <i>Acacia</i> Open Woodlands, Mallee Woodlands and Shrublands.</p> <p>Total Area = 163 ha (~2.7%)</p>	
4	<p><u>Quartz/Rocky Plains</u></p> <p><i>Acacia</i> Forests and Woodlands, <i>Casuarina</i> Forests and Woodlands, Mallee Woodlands and Shrublands.</p> <p>Total Area = 335 ha (~5.6%)</p>	

No.	Fauna Habitat Description	Example Image
5	<p><u>Sand Dunes</u></p> <p>Eucalypt Woodlands, Mallee Woodlands and Shrublands.</p> <p>Total Area = 252 ha (~4.2%)</p>	
6	<p><u>Sand-Loam Plains</u></p> <p>Acacia Forests and Woodlands, Regrowth, modified native vegetation.</p> <p>Total Area = 256 ha (~4.3%)</p>	
7	<p><u>Sandplains</u></p> <p>Acacia Forests and Woodlands, Eucalypt Woodlands, Mallee Woodlands and Shrublands, Regrowth, modified native vegetation.</p> <p>Total Area = 4,539 ha (~75.9%)</p>	

6.3.2 Opportunistic Fauna Observations

Opportunistic fauna observations are listed in Appendix B. A total of 56 native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) within the survey area over the three day survey period. Evidence of four introduced species using the survey area was also gathered.

With respect to conservation significant species, evidence (back filled burrows) of the southern marsupial mole (P4 (DPaW Priority Species) was found at one location and the rainbow bee-eater (S5 (WC Act) and Migratory (EPBC Act)) was observed and heard at several locations.

6.4 FAUNA INVENTORY – SUMMARY

6.4.1 Vertebrate Fauna

Table 2 summarises the numbers of potential species based on vertebrate class considered likely to be present in the general vicinity of the survey area based on the complete list held Appendix B.

Not all species listed in existing databases and publications as potentially occurring within the region (i.e. *EPBC Act's* Threatened Fauna and Migratory species lists, DPAW's NatureMap Fauna Database and various publications) are considered likely to be present within the survey area. The list of potential fauna takes into consideration that firstly the species in question is not known to be locally/regionally extinct and secondly that suitable habitat for each species, as identified during the habitat assessment, is present within the survey area, though compiling an accurate list has limitations (see Section 5 above).

Table 2: Summary of Potential Vertebrate Fauna Species (as listed in Appendix B)

Group	Total number of potential species	Potential number of specially protected species	Potential number of migratory species	Potential number of priority species	Number of species observed Level 1 Survey
Amphibians	9	0	0	0	0
Reptiles	105	0	0	1	11
Birds	103	3	1	1	40
Non-Volant Mammals	29 ⁹	0	0	2	9 ⁴
Volant Mammals (Bats)	8	0	0	0	0
Total	254⁹	1	1	6	60⁴

Superscript = number of introduced species included in the total. Note: Where a species state and federal conservation status is different, the highest category is used.

Despite the omission of some species it should be noted that the list provided is still very likely an over estimation of the fauna species utilising the site (either on a regular or infrequent basis) as a result of the precautionary approach adopted for the assessment. At any one time only a subset of the listed potential species are likely to be present within the bounds of the study area.

6.4.2 Vertebrate Fauna of Conservation Significance

A review of the *EPBC Act* threatened fauna list, DPAW's Threatened Fauna Database and Priority List, unpublished reports and scientific publications identified a number of specially protected, migratory or priority fauna species as having been previously recorded or as being potentially present in the general vicinity of the survey area.

Of these species, those that have no potential whatsoever to utilise the study area for any purpose have been omitted from the potential list for the site (Appendix B), principally due to available information suggesting the survey area is outside of their current documented range, lack of suitable habitat on-site (including extent and/or quality) or known local/regional extinction.

Two vertebrate fauna species of conservation significance (listed under State or Federal threatened/migratory species lists or as a DPaW priority species) were positively identified as utilising the study area for some purpose during the survey period, this being:

- **Rainbow Bee-eater *Merops ornatus* – Migratory (*EPBC Act*), S5 (*WC Act*)**

Observed/heard on several occasions during survey period. The rainbow bee-eater is a very common and widespread seasonal visitor to the southern half of WA and would not be specifically attracted to the site. Some potential for the species to breed in some sections of the survey area where ground conditions are suitable. Population levels would however not be significant as it usually breeds in pairs and rarely in small colonies (Johnstone and Storr, 1998).

Extent of potential habitat within the survey area: Foraging habitat - sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains (5,983 ha – 100% of total area). Breeding habitat - sand plains and sand dunes (4,791 ha - ~80.1% of total area).

- **Southern Marsupial Mole *Notoryctes typhlops* – P4 (DPaW Priority Species)**

The distinctive backfilled burrows of this species were found in the walls of a temporary holding dam constructed on a sand dune in the extreme northern section of the proposed borefield, north of the Great Central Road (Figure 2), confirming this species presence in this particular area. This area of dunes appears to be separate from those in other sections of Yamarna (e.g. Gruyere mine area) where no evidence of the species has been found despite targeted searches (i.e. trenches and examination of large cutting in dunes) (Harewood 2015a).

Extent of potential habitat within the survey area: Sand dunes in the northern section of the western borefield, mainly north of the Great Central Road (33 ha – ~0.6% of total area).

The current status on site and/or in the general area of some other species is difficult to determine, however, based on the habitats present and, in some cases, recent nearby records, six additional species of conservation significance can be regarded as possibly utilising the survey area for some purpose at times, these being:

- **Buff-snouted Blind Snake *Anilius margaretae* – P2 (DPaW Priority Species)**

The status of this species in the survey area is difficult to determine. Given suitable habitat (i.e. sand dunes and sand plains) occurs its presence cannot be discounted despite not being recorded during previously fauna surveys nearby and in the wider area (ecologia 2009, KLA 2012, KEC 2014 and Rapallo 2015). While there are limited records for this species, it appears to have a wide distribution across the Great Victoria Desert. The lack of records could be attributed to the areas remoteness and the secretive habits of blind snakes and it may in fact be more common than records indicate.

Extent of potential habitat within the survey area: Sand plains and sand dunes (4,791 ha - ~80.1% of total area).

- **Malleefowl *Leipoa ocellata* – S3 (WC Act), Vulnerable (EPBC Act)**

No evidence of this species (individuals, foot prints, feathers or recent/old nest mounds) was observed during the survey period. Habitat appears unsuitable or at best marginal within much of the area surveyed primarily due to the generally sparse nature of the vegetation, recent fires and/or a lack of leaf litter.

Individual malleefowl have very occasionally been observed in the general vicinity of Yamarna (pers. comms. “Driller” and TOs) but no recent active or inactive mounds have ever been recorded despite several fauna and flora surveys over significant areas of land associated with the proposed mining operations. This would suggest that the habitats present are unsuitable for breeding and that the observations made are of transient individuals.

For these reasons malleefowl have been listed as a potential species due to the possibility for occasional transient individuals to occur, but they are considered very unlikely to breed within the borefield area itself.

Extent of potential habitat within the survey area: Vegetated clay loam plains, sand loam plains, drainage depressions and quartz rocky plains

(926 ha - ~15.5% of total area). Most habitat does however appear marginal in quality at best.

- **Peregrine Falcon *Falco peregrinus* – S7 (WC Act)**

The species potentially utilises some sections of the survey area as part of a much larger home range for foraging purposes only. Would only be represented by a very small number of individuals for limited periods. Previously recorded at Tropicana (ecologia 2009).

Extent of potential habitat within the survey area: Foraging habitat - sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains (5,983 ha – 100% of total area). Breeding habitat - Large trees with open spouts suitable for nesting or abandoned bird of prey nests – total number unknown, but none observed during field survey.

- **Princess Parrot *Polytelis alexandrae* – Vulnerable (EPBC Act), P4 (DPaW Priority Species)**

The species may frequent the survey area at times, but given it is highly nomadic, its frequency of occurrence would be very low and generally temporary. Areas containing *Euclayptus gongylocarpa* woodland are of most significance as they have the potential to contain larger trees with hollows that may represent potential breeding habitat.

Extent of potential habitat within the survey area: Foraging habitat - Vegetated sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains (5,983 ha – 100% of total area). Breeding habitat - Large trees with hollows suitable for nesting – total number, if any, unknown.

- **Striated Grasswren (sand plain) *Amytornis striatus striatus* - P4 (DPaW Priority Species)**

Not observed during the field survey or during any other recent survey at Yamarna however there is a NatureMap record along the Anne Beadell Highway just east of the borefield survey area made in the year 2000 (DPaW 2015b) and therefore it is considered to be a potential species where suitable habitat occurs. This species has also been recorded recently much further south at several locations along the Tropicana to Sunrise Dam pipeline route (KEC 2014).

Extent of potential habitat within the survey area: Sand plains, sand dunes, clay loam plains and sand loam plains (5,047 ha – 84.4% of total area).

- **Brush-tailed Mulgara *Dasycercus blythi* - P4 (DPaW Priority Species)**

There is a paucity of records of this species in the area and no evidence of its presence was observed during the field survey or any previous

survey at Yamarna including those where trapping has been employed (KLA 2012 and Rapallo 2015). The current status in the survey area is therefore difficult to determine. The most recent nearby records are just south west of Yamarna from 1990 (DPaW 2015) and it was also recorded at several locations along the Tropicana to Sunrise Dam pipeline route (KEC 2014). This information coupled with the fact that habitat in some sections of the survey area appears suitable (e.g. sand plains, sand ridges, *Acacia* shrubland on loamy sand) suggests that the species may be present in some areas.

Extent of potential habitat within the survey area: Sand plains, sand dunes, clay loam plains and sand loam plains (5,047 ha – 84.4% of total area).

It should be recognised that habitat within the survey area for some of the species listed above, while considered possibly suitable, may be marginal in extent/quality and the species listed may therefore only visit the area for short periods or as rare/uncommon vagrants.

Additional details on these species and others, along with reasons for the omission of some from the potential listing are provided in Table 3 below and in Appendix D.

Table 3: Likelihood of Occurrence – Vertebrate Fauna Species of Conservation Significance (continues on following pages)

Species	Conservation Status (see Appendix A for codes)			Potential Habitats Within Survey Area			Likelihood of Occurrence
	EPBC Act	WC Act	DPAW Priority	Foraging Habitat	Breeding Habitat	Total Extent (ha)	
Buff-snouted Blind Snake <i>Anilius margaretae</i>	-	-	P2	Sand plains and sand dunes		4,791 ha - ~80.1% of total area	Possible
Great Desert Skink <i>Liopholis kintorei</i>	VU	S3	-	Sand plains and sand dunes		4,791 ha - ~80.1% of total area	Unlikely. Outside current documented range/locally extinct?
Woma <i>Aspidites ramsayi</i>	-	-	P1	Sand plains and sand dunes		4,791 ha - ~80.1% of total area	Unlikely. Outside current documented range/locally extinct?
Malleefowl <i>Leipoa ocellata</i>	VU	S3	-	Vegetated clay loam plains, sand loam plains, drainage depressions and quartz rocky plains.	None	926 ha - ~15.5% of total area	Possible transient individuals only. Breeding unlikely.
Great Egret <i>Ardea alba</i>	Mig	S5	-	Drainage depressions, closed depressions. (when inundated).	None	429 ha - ~7.1% of total area	Unlikely. Outside normal range.

Species	Conservation Status (see Appendix A for codes)			Potential Habitats Within Survey Area			Likelihood of Occurrence
	EPBC Act	WC Act	DPAW Priority	Foraging Habitat	Breeding Habitat	Total Extent (ha)	
Peregrine Falcon <i>Falco peregrinus</i>	-	S7	-	sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains	Large trees with open spouts suitable for nesting or abandoned bird of prey nests	5,983 ha – 100% of total area No potential nest sites observed.	Possible.
Grey Falcon <i>Falco hypoleucos</i>	-	S3	-	sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains.	None	5,983 ha – 100% of total area	Unlikely. Outside normal range.
Oriental Plover <i>Charadis veredus</i>	Mig	S5	-	Closed depressions (with chenopods).	None	76 ha - ~1.3% of total area.	Unlikely Outside normal range.
Princess Parrot <i>Polytelis alexandrae</i>	VU	-	P4	Vegetated sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains	Large trees with hollows suitable for nesting.	5,983 ha – 100% of total area Number of suitable tree hollows, if any unknown.	Possible
Night Parrot <i>Pezoporus occidentalis</i>	EN	S1	-	Vegetated sand plains, closed depression (with chenopods)		4,615 ha – 77.2 % of total area	Unlikely. Outside current documented range/locally extinct?
Fork-tailed Swift <i>Apus pacificus</i>	Mig	S5	-	Air space over entire area.	None	5,983 ha – 100% of total area.	Unlikely.
Striated Grasswren (sandplain) <i>Amytornis striatus striatus</i>	-	-	P4	Sand plains, sand dunes, clay loam plains and sand loam plains		5,047 ha – 84.4% of total area	Possible.
Thick-billed Grass-wren (western ssp) <i>Amytornis textilis textilis</i>	-	-	P4	Densely vegetated sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains		5,983 ha – 100% of total area	Unlikely. Outside current documented range/locally extinct?
Rainbow Bee-eater <i>Merops ornatus</i>	Mig	S5	-	sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains	Sand plains and sand dunes.	5,983 ha – 100% of total area.	Known to Occur
Grey Wagtail <i>Motacilla cinerea</i>	Mig	S5	-	None.		0 ha	Unlikely.
Yellow Wagtail <i>Motacilla flava</i>	Mig	S5	-	None.		0 ha	Unlikely.
Brush-tailed Mulgara <i>Dasyercus blythi</i>	-	-	P4	Sand plains, sand dunes, clay loam plains and sand loam plains.		5,047 ha – 84.4% of total area	Possible.
Southern Marsupial Mole <i>Notoryctes typhlops</i>	-	-	P4	Sand dunes in the northern section of western borefield.		33 ha – ~0.6% of total area	Known to Occur

Species	Conservation Status (see Appendix A for codes)			Potential Habitats Within Survey Area			Likelihood of Occurrence
	EPBC Act	WC Act	DPAW Priority	Foraging Habitat	Breeding Habitat	Total Extent (ha)	
Sandhill Dunnart <i>Sminthopsis psammophila</i>	EN	S2	-	None.		0 ha	Unlikely. Habitat Appears unsuitable.
Bilby <i>Macrotis lagotis</i>	VU	S3	-	Sand plains, sand dunes, quartz rocky plains, clay loam plains, sand loam plains and drainage depressions.		5,717 ha - ~95.6% of total area.	Unlikely. Outside current documented range/locally extinct?
Central Long-eared Bat <i>Nyctophilus major tor</i>	-	-	P4	Sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains.		5,983 ha – 100% of total area	Unlikely. Outside current documented range

7. CONCLUSION & RECOMMENDATIONS

The level 1 fauna assessment reported on here was undertaken for the purposes of delineating and characterising the fauna habitats and faunal assemblages present in the survey area, with an emphasis on identifying which terrestrial fauna species of conservation significance may be present.

Based on available information it has been concluded that no terrestrial invertebrate or vertebrate fauna species of significance are unlikely to be significantly impacted on by installation and operation of a borefield. Given the relatively small size of the impact footprint at any one point, the linear nature of pipeline routes and the extensive habitat connectivity with adjoining areas impacts on fauna and fauna habitat at anyone point are anticipated to be small/negligible and therefore manageable.

The following proposed fauna management recommendations are considered most important and while likely to form part of existing procedures and protocols should be made a priority during borefield construction and operation and should be taken into consideration if considered relevant and reasonable/practicable to implement. These recommendations are not necessarily exhaustive and others may need consideration after consultation with relevant regulatory authorities.

It is recommended that:

- Planning for development should aim to minimise as much as possible the area of remnant vegetation requiring removal. Existing cleared areas/tracks should be used in preference to clearing additional areas.
- In particular impact to areas of woodland (e.g. *Eucalyptus gongylocarpa*) should be avoided if possible and in particular those specimens containing existing hollows should be a priority for retention. Sand dunes,

particularly in the northern section of the western borefield area should also be avoided if possible.

- During site works, areas requiring clearing should be clearly marked and access to other areas restricted to prevent accidental clearing of areas to be retained. Unauthorised off-track driving and parking should be prohibited.
- No dead, standing or fallen timber should be removed unnecessarily. Logs (hollow or not) and other debris resulting from land clearing should be used to enhance fauna habitat in untouched and rehabilitated areas if possible.
- Cleared areas should be rehabilitated as soon as is practicable. Monitoring of rehabilitated areas should be carried out and included weed management.
- A Construction and Operations Fire Management Plan should be prepared to reduce the risk of unplanned fires and provide contingency measures to minimise any associated impacts. The plan will include a contingency and response plan in the event of any bushfires that commence as a result of the works on site.
- All staff working on site should be made aware that native fauna is protected. Personnel working on the project should not be allowed to bring firearms, other weapons or pets onsite. Personnel should be discouraged from feeding native and introduced fauna.
- Infrastructure should be positioned to avoid or minimise the disruption to surface and sub-surface hydrology where possible. Levees and drains designed to mimic natural drainage flows should be incorporated in plans where disruptions may occur.
- Any holes, pits or trenches should be kept open for only as long as necessary and suitable escape ramps (45° batter) and bridging provided if the site is to be left unattended for extended periods. Any manmade holes, pits or trenches likely to trap animals should be inspected immediately prior to filling.

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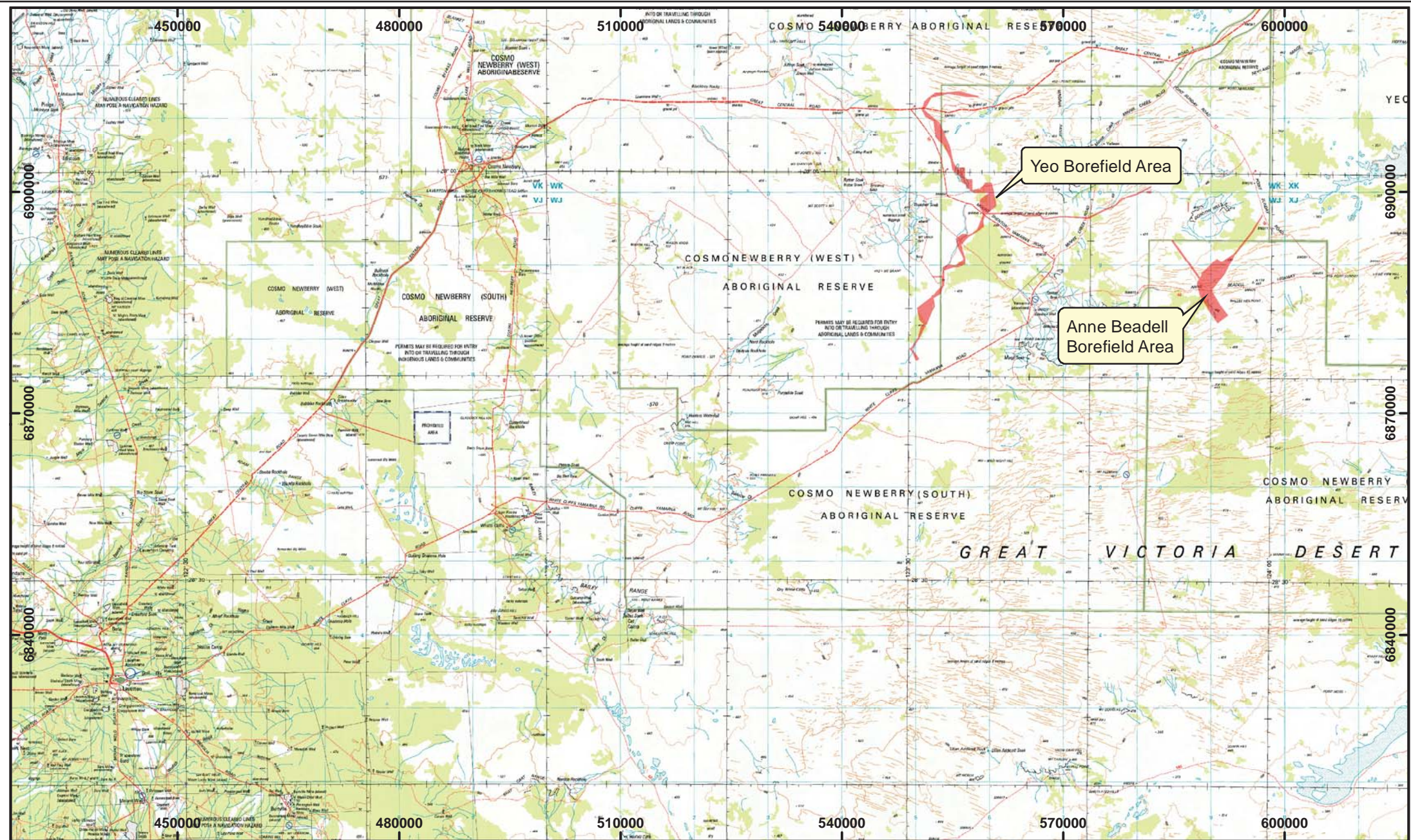
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FIGURES

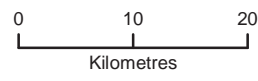


Yeo Borefield Area

Anne Beadell Borefield Area

Legend

 Gruyere Borefield Project Survey Areas



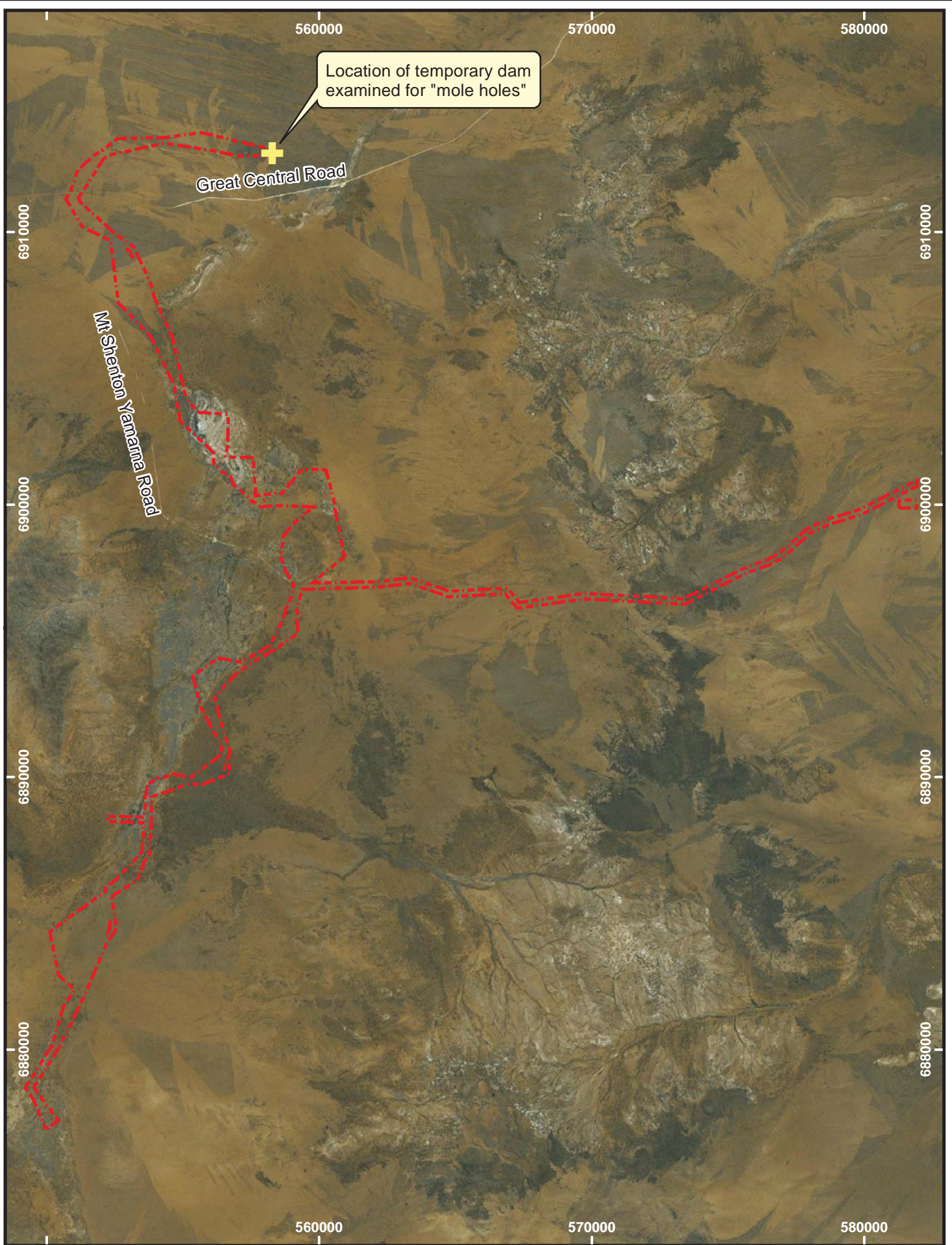
Gold Road Resources Ltd
Gruyere Borefield Project

**Survey Areas
and Surrounds**

DRAWN: G Harewood
DATE: Dec 2015
SCALE: 1:660,000

PROJECTION: MGA Zone 51

Figure: 1




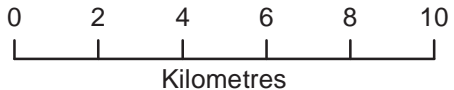
Location of temporary dam examined for "mole holes"

Great Central Road

Mt Shenton Yamarna Road

Legend

 Yeo Borefield Survey Area



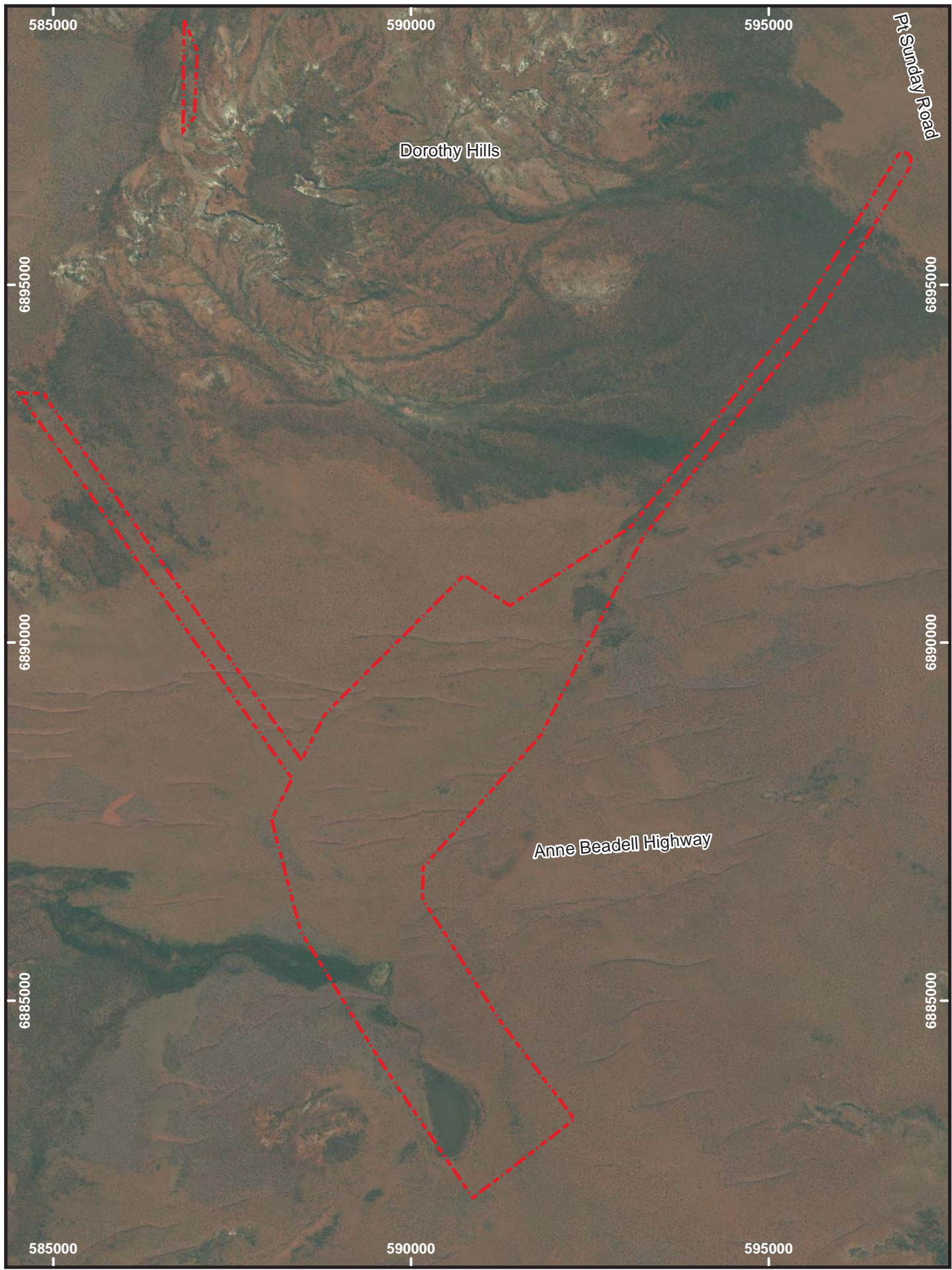
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 DATE: Dec 2015
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Gold Road Resources Ltd
 Gruyere Borefield Project


Yeo Borefield Area Air Photo

PROJECTION: UTM - MGA Zone 51

Figure: 2



Legend

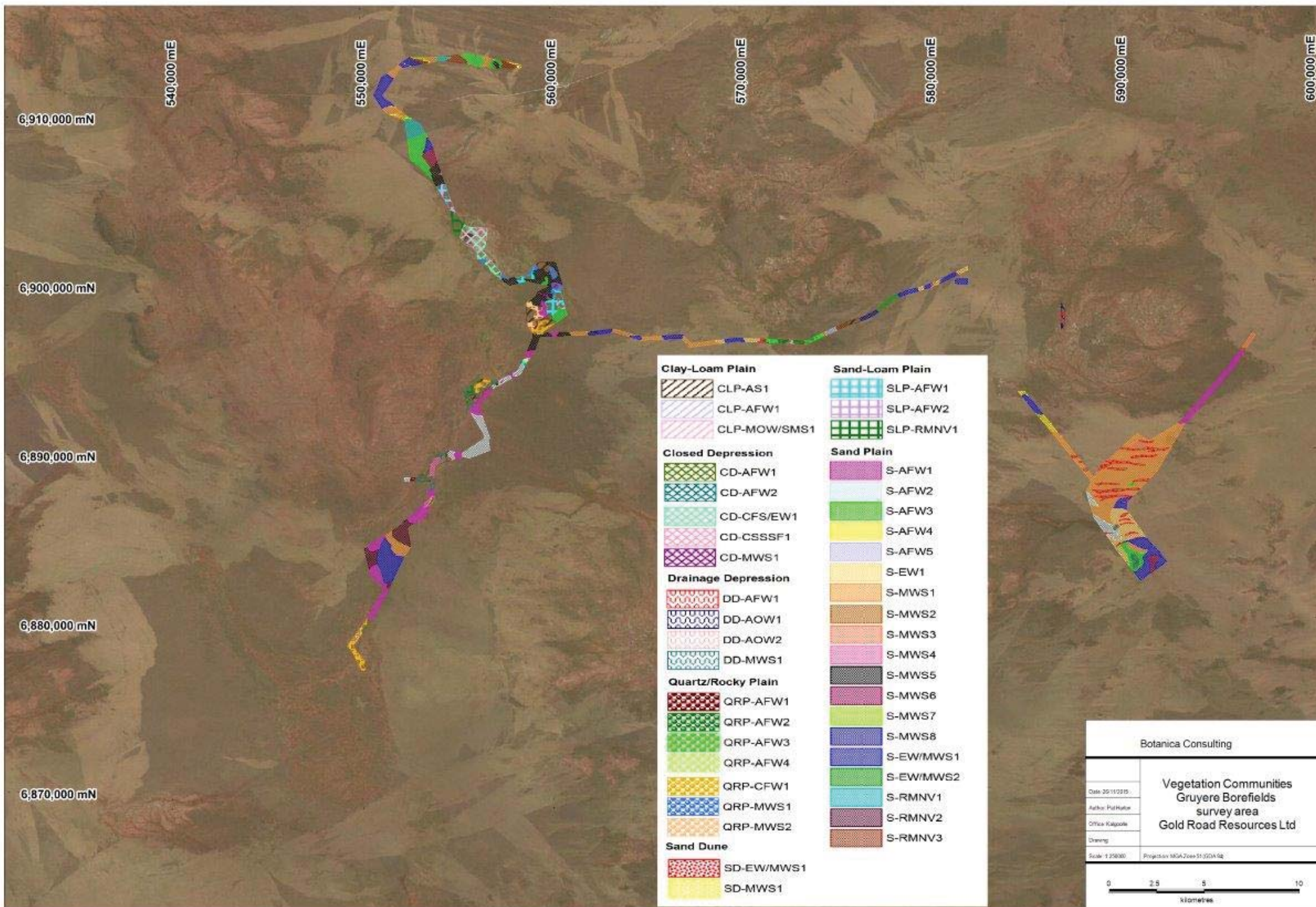
 Anne Beadell Borefield Survey Area



DRAWN: G Harewood
 DATE: Dec 2015
 SCALE: 1:70,000

Gold Road Resources Ltd
 Gruyere Borefield Project

Anne Beadell Borefield Area Air Photo



APPENDIX A

CONSERVATION CATEGORIES

EPBC Act (1999) Threatened Fauna Categories

Threatened fauna may be listed under Section 178 of the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* in any one of the following categories:

Category	Code	Description
Extinct	E	There is no reasonable doubt that the last member of the species has died.
*Extinct in the wild	EW	A species (a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
*Critically Endangered	CE	A species is facing an extremely high risk of extinction in the wild in the immediate future.
*Endangered	EN	A species: (a) is not critically endangered; and (b) is facing a very high risk of extinction in the wild in the near future.
*Vulnerable	VU	A species (a) is not critically endangered or endangered; and (b) is facing a high risk of extinction in the wild in the medium-term future.
Conservation Dependent	CD	A species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered
*Migratory	Migratory	(a) all migratory species that are: (i) native species; and (ii) from time to time included in the appendices to the Bonn Convention; and (b) all migratory species from time to time included in annexes established under JAMBA, CAMBA and ROKAMBA; and (c) all native species from time to time identified in a list established under, or an instrument made under, an international agreement approved by the Minister.
Marine	Ma	Species in the list established under s248 of the <i>EPBC Act</i>

Note: Only species in those categories marked with an asterisk are matters of national environmental significance (NES) under the *EPBC Act*.

Wildlife Conservation (Specially Protected Fauna) Notice 2015 Categories

Published as Specially Protected under the *Wildlife Conservation Act 1950*, and listed under Schedules 1 to 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

Category	Code	Description
Schedule 1 Critically Endangered species	CR	Threatened species considered to be facing an extremely high risk of extinction in the wild.
Schedule 2 Endangered species	EN	Threatened species considered to be facing a very high risk of extinction in the wild.
Schedule 3 Vulnerable species	VU	Threatened species considered to be facing a high risk of extinction in the wild.
Schedule 4 Presumed extinct species	EX	Species which have been adequately searched for and there is no reasonable doubt that the last individual has died.
Schedule 5 Migratory birds protected under an international agreement	IA	Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds.
Schedule 6 Fauna that is of special conservation need as conservation dependent fauna	CD	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Schedule 7 Other specially protected fauna.	OS	Fauna otherwise in need of special protection to ensure their conservation.

Western Australian DPaW Priority Fauna Categories

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

Category	Code	Description
Priority 1 Poorly Known Species.	P1	Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
Priority 2 Poorly Known Species.	P2	Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3 Poorly Known Species.	P3	Species that are known from several locations and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4 Rare, Near Threatened and other species in need of monitoring.	P4	<p>(a) Rare: Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.</p> <p>(b) Near Threatened: Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>

*Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

IUCN Red List Threatened Species Categories

The *IUCN Red List of Threatened Species™* is a checklist of taxa that have undergone an extinction risk assessment using the *IUCN Red List Categories and Criteria*.

Categories are summarized below.

Category	Code	Description
Extinct	EX	Taxa for which there is no reasonable doubt that the last individual has died.
Extinct in the Wild	EW	Taxa which is known only to survive in cultivation, in captivity or and as a naturalised population well outside its past range and it has not been recorded in known or expected habitat despite exhaustive survey over a time frame appropriate to its life cycle and form.
Critically Endangered	CR	Taxa facing an extremely high risk of extinction in the wild.
Endangered	EN	Taxa facing a very high risk of extinction in the wild.
Vulnerable	VU	Taxa facing a high risk of extinction in the wild.
Near Threatened	NT	Taxa which has been evaluated but does not qualify for CR, EN or VU now but is close to qualifying or likely to qualify in the near future.
Least Concern	LC	Taxa which has been evaluated but does not qualify for CR, EN, VU, or NT but is likely to qualify for NT in the near future.
Data Deficient	DD	Taxa for which there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status.
Not Evaluated	NE	Taxa which has not been evaluated.

A full list of categories and their meanings are available at:

<http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria>

APPENDIX B

**VERTEBRATE FAUNA RECORDED OR POTENTIALLY IN REGION OF
SURVEY AREA**

Fauna Recorded or Potentially in Region of Survey Area

Compiled by Greg Harewood - December 2015

Recorded (Captured/Sighted/Heard/Signs) = X

Gruyere Borefield Project - Gold Road Resources Ltd, Yamarna Station, WA.

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Class Family Species	Common Name	Conservation Status	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW
			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015

Amphibia

Myobatrachidae

Ground or Burrowing Frogs

<i>Neobatrachus aquilonius</i>	Northern Burrowing Frog	LC										X
<i>Neobatrachus kunapalari</i>	Kunapalari Frog	LC										X
<i>Neobatrachus sudellae</i>	Sudell's Frog	LC										X
<i>Neobatrachus sutor</i>	Shoemaker Frog	LC					X		X			X
<i>Neobatrachus wilsmorei</i>	Plonking Frog	LC										

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Class Family Species	Common Name	Conservation Status	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW
			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
<i>Platyplectrum spenceri</i>	Centralian Burrowing Frog											
<i>Pseudophryne occidentalis</i>	Western Toadlet	LC										
Hylidae Tree or Water-Holding Frogs												
<i>Cyclorana maini</i>	Sheep Frog	LC										X
<i>Cyclorana platycephala</i>	Water-holding Frog	LC										

Reptilia

Carphodactylidae

Knob-tailed Geckos

<i>Nephrurus laevis</i>	Pale Knob-tailed Gecko					X	X				X	X
<i>Nephrurus levis</i>	Smooth Knob-tailed Gecko						X				X	
<i>Nephrurus vertebralis</i>	Midline Knob-tailed Gecko											X

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Class Family Species	Common Name	Conservation Status	GH 2015a	GH 2015b	GH 2015c	Rapallo 2015	KEC 2014	GH 2014	KLA 2012	GH 2011	ecologia 2009	DPaW 2015
Diplodactylidae												
Geckoes												
<i>Diplodactylus conspicillatus</i>	Fat-tailed Gecko						X	X		X		X
<i>Diplodactylus granariensis</i>	Western Stone Gecko											X
<i>Diplodactylus pulcher</i>	Western Saddled Ground Gecko								X			X
<i>Lucasium damaeum</i>	Beaded Gecko					X	X				X	X
<i>Lucasium squarrosus</i>	Mottled Ground Gecko											
<i>Lucasium stenodactylus</i>	Sand-plain Gecko	LC										X
<i>Rhynchoedura ornata</i>	Beaked Gecko					X	X				X	X
<i>Strophurus assimilis</i>	Goldfields Spiny-tailed Gecko						X					
<i>Strophurus ciliaris</i>	Spiny-tailed Gecko											X
<i>Strophurus elderi</i>	Jewelled Gecko					X	X				X	X

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Class Family Species	Common Name	Conservation Status	GH 2015a	GH 2015b	GH 2015c	Rapallo 2015	KEC 2014	GH 2014	KLA 2012	GH 2011	ecologia 2009	DPaW 2015
<i>Strophurus intermedius</i>	Southern Spiny-tailed Gecko								X			X
<i>Strophurus strophurus</i>	Ring-tailed Gecko					X					X	X
<i>Strophurus wellingtonae</i>	Western-shield Spiny-tailed Gecko	LC										
Gekkonidae												
Geckoes												
<i>Gehyra purpurascens</i>	Purple Arid Dtella					X	X				X	X
<i>Gehyra variegata</i>	Variegated Dtella					X	X		X	X	X	X
<i>Heteronotia binoei</i>	Bynoe's Gecko					X	X		X		X	X
<i>Underwoodisaurus milii</i>	Barking Gecko											

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Class Family Species	Common Name	Conservation Status	GH 2015a	GH 2015b	GH 2015c	Rapallo 2015	KEC 2014	GH 2014	KLA 2012	GH 2011	ecologia 2009	DPaW 2015
Pygopodidae Legless Lizards												
<i>Delma butleri</i>	Unbanded Delma								X		X	X
<i>Delma nasuta</i>	Long-nosed Delma					X	X				X	X
<i>Delma petersoni</i>	Peterson's Delma						X				X	
<i>Lialis burtonis</i>	Burton's Legless Lizard					X		X			X	X
<i>Pygopus nigriceps</i>	Hooded Scaly Foot			X		X	X		X		X	X

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Class Family Species	Common Name	Conservation Status	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW
			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
Agamidae Dragon Lizards												
<i>Caimanops amphiboluroides</i>	Mulga Dragon		X				X			X	X	
<i>Ctenophorus caudicinctus</i>	Ring-tailed Dragon								X			X
<i>Ctenophorus clayi</i>	Collared Dragon										X	X
<i>Ctenophorus cristatus</i>	Bicycle Dragon						X				X	
<i>Ctenophorus fordi</i>	Mallee Sand Dragon						X				X	X
<i>Ctenophorus isolepis</i>	Military Dragon		X			X	X	X			X	X
<i>Ctenophorus nuchalis</i>	Central Netted Dragon		X			X					X	X
<i>Ctenophorus pictus</i>	Painted Dragon								X			X
<i>Ctenophorus reticulatus</i>	Western Netted Dragon					X			X		X	X
<i>Ctenophorus scutulatus</i>	Lozenge-marked Bicycle Dragon		X	X		X	X		X			X

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Class Family Species	Common Name	Conservation Status	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW	
			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015	
<i>Diporiphora paraconvergens</i>	Grey-striped Western Desert Dragon						X					X	
<i>Diporiphora reginae</i>	Red-rumped Two-lined Dragon							X				X	
<i>Gowidon longirostris</i>	Long-nosed Dragon											X	
<i>Moloch horridus</i>	Thorny Devil				X	X	X	X				X	X
<i>Pogona minor</i>	Western Bearded Dragon						X	X				X	X
<i>Tympanocryptis cephalata</i>	Pebble Dragon												X

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			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015	
Varanidae													
Monitor's or Goanna's													
<i>Varanus brevicauda</i>	Short-tailed Pygmy Monitor						X					X	X
<i>Varanus caudolineatus</i>	Stripe-tailed Pygmy Monitor										X		X
<i>Varanus eremius</i>	Pygmy Desert Monitor											X	X
<i>Varanus giganteus</i>	Perentie			X			X	X	X			X	X
<i>Varanus gilleni</i>	Pygmy Mulga Monitor											X	X
<i>Varanus gouldii</i>	Sand Monitor		X		X		X	X		X		X	X
<i>Varanus panoptes</i>	Yellow-spotted Monitor						X	X					
<i>Varanus tristis</i>	Black-headed Monitor		X				X	X				X	X

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Scincidae Skinks												
<i>Cryptoblepharus buchananii</i>	Fence Skink											
<i>Cryptoblepharus carnabyi</i>	Spiny-palmed Fence Skink										X	
<i>Ctenotus ariadnae</i>	Ariadna's Ctenotus										X	X
<i>Ctenotus brooksi</i>	Central Wedge-snout Ctenotus					X	X				X	X
<i>Ctenotus calurus</i>	Blue-tailed Skink					X	X				X	X
<i>Ctenotus dux</i>	Narrow-lined Skink					X	X	X			X	X
<i>Ctenotus grandis</i>	Giant Desert Ctenotus										X	X
<i>Ctenotus greeri</i>	Spotted-necked Ctenotus		X				X				X	X
<i>Ctenotus hanloni</i>	Nimble Ctenotus											X
<i>Ctenotus helenae</i>	Dusky Ctenotus					X	X		X		X	X

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<i>Ctenotus leae</i>	Centralian Coppertail											X
<i>Ctenotus leonhardii</i>	Leonhardi's Skink					X	X		X		X	X
<i>Ctenotus nasutus</i>	Long-snouted Ctenotus					X						X
<i>Ctenotus pantherinus</i>	Leopard Ctenotus					X	X	X	X		X	X
<i>Ctenotus piankai</i>	Coarse Sands Ctenotus					X						X
<i>Ctenotus quattuordecimlineatus</i>	Fourteen-lined Ctenotus					X	X				X	X
<i>Ctenotus schomburgkii</i>	Barred Wedge-snout Ctenotus					X	X	X			X	X
<i>Ctenotus severus</i>	Stern Rock Ctenotus											
<i>Ctenotus uber</i>	Spotted Ctenotus					X						
<i>Cyclodomorphus melanops</i>	Eastern Slender Blue-tongue						X				X	X
<i>Egernia depressa</i>	Pygmy Spiny-tailed Skink						X					

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			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015	
<i>Egernia formosa</i>	Goldfields Crevice Skink												
<i>Eremiascincus pallidus</i>	Pale Sand-swimmer		X				X	X		X		X	
<i>Lerista bipes</i>	Western Two-toed Slider		X				X	X	X			X	X
<i>Lerista desertorum</i>	Great Desert Slider		X	X			X	X		X		X	X
<i>Lerista kingi</i>	Common Mulch Skink												
<i>Lerista taeniata</i>	Ribbon Slider												X
<i>Lerista timida</i>	Timid Slider					X	X	X				X	
<i>Liopholis inornata</i>	Desert Skink							X		X		X	X
<i>Liopholis striata</i>	Night Skink						X					X	X
<i>Menetia greyii</i>	Dwarf Skink							X				X	X
<i>Morethia butleri</i>	Woodland Dark-flecked Morethia							X				X	X

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			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
<i>Proablepharus reginae</i>	Western Soil-Crevice Skink							X			X	
<i>Tiliqua multifasciata</i>	Central Blue-tongue								X		X	X
<i>Tiliqua occipitalis</i>	Western Bluetongue				X		X				X	X
Typhlopidae												
Blind Snakes												
<i>Anilius bicolor</i>	Dark-spined Blind Snake											
<i>Anilius endoterus</i>	Interior Blind Snake										X	
<i>Anilius hamatus</i>	Northern Hook-snouted Blind Snake											
<i>Anilius margaretae</i>	Buff-snouted Blind Snake	P2										
<i>Anilius waitii</i>	Common Beaked Blind Snake										X	
Boidae												
Pythons, Boas												
<i>Antaresia stimsoni</i>	Stimson's Python											X

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Elapidae												
Elapid Snakes												
<i>Acanthophis pyrrhus</i>	Desert Death Adder											X
<i>Brachyuropis approximans</i>	North-western Shovel-nosed Snake					X						
<i>Brachyuropis fasciolata</i>	Narrow-banded Shovel-nosed Snake						X				X	
<i>Brachyuropis semifasciata</i>	Southern Shovel-nosed Snake						X				X	
<i>Demansia psammophis</i>	Yellow-faced Whipsnake						X				X	X
<i>Furina ornata</i>	Moon Snake											
<i>Neelaps bimaculatus</i>	Black-naped Snake										X	X
<i>Parasuta monachus</i>	Monk Snake						X				X	X
<i>Pseudechis australis</i>	Mulga Snake					X				X	X	X
<i>Pseudechis butleri</i>	Spotted Mulga Snake											

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			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
<i>Pseudonaja modesta</i>	Ringed Brown Snake						X				X	X
<i>Pseudonaja nuchalis</i>	Gwardar										X	X
<i>Simoselaps anomalus</i>	Desert Banded Snake						X					X
<i>Simoselaps bertholdi</i>	Jan's Banded Snake		X					X			X	X
<i>Suta fasciata</i>	Rosen's Snake											X

Aves

Casuariidae

Emus, Cassowaries

<i>Dromaius novaehollandiae</i>	Emu	LC	X	X	X	X	X	X	X	X	X	X
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Megapodiidae

Moundbuilders

<i>Leipoa ocellata</i>	Malleefowl	S3 VU VU A2bce+3ce						X			X	
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			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
Accipitridae Kites, Goshawks, Eagles, Harriers												
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk	LC		X							X	X
<i>Accipiter fasciatus</i>	Brown Goshawk	LC	X			X				X		X
<i>Aquila audax</i>	Wedge-tailed Eagle	LC	X			X	X	X	X	X	X	X
<i>Aquila morphnoides</i>	Little Eagle	LC			X		X				X	
<i>Circus assimilis</i>	Spotted Harrier	LC										
<i>Elanus caeruleus</i>	Black-shouldered Kite	LC							X			
<i>Haliastur sphenurus</i>	Whistling Kite	LC				X						
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	LC	X		X							

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Falconidae												
Falcons												
<i>Falco berigora</i>	Brown Falcon	LC	X	X	X	X	X	X	X	X	X	X
<i>Falco cenchroides</i>	Australian Kestrel	LC	X	X	X	X	X	X	X		X	X
<i>Falco longipennis</i>	Australian Hobby	LC				X	X	X	X	X	X	X
<i>Falco peregrinus</i>	Peregrine Falcon	S7 LC									X	X
Otididae												
Bustards												
<i>Ardeotis australis</i>	Australian Bustard	LC		X	X		X	X	X		X	X
Turnicidae												
Button-quails												
<i>Turnix velox</i>	Little Button-quail	LC							X	X	X	X

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Charadriidae												
Lapwings, Plovers, Dotterels												
<i>Charadrius melanops</i>	Black-fronted Dotterel	LC										
<i>Charadrius ruficapillus</i>	Red-capped Plover	LC					X					
<i>Peltohyas australis</i>	Inland Dotterel											
Columbidae												
Pigeons, Doves												
<i>Geopelia cuneata</i>	Diamond Dove	LC							X	X	X	X
<i>Ocyphaps lophotes</i>	Crested Pigeon	LC	X	X	X	X	X	X	X	X	X	X
<i>Phaps chalcoptera</i>	Common Bronzewing	LC		X	X	X	X	X	X		X	X

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			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
Psittacidae Parrots												
<i>Cacatua roseicapilla</i>	Galah	LC	X	X	X	X	X		X		X	
<i>Melopsittacus undulatus</i>	Budgerigar	LC					X		X	X	X	X
<i>Neophema bourkii</i>	Bourke's Parrot	LC				X			X			
<i>Neophema splendida</i>	Scarlet-chested Parrot	LC					X				X	X
<i>Nymphicus hollandicus</i>	Cockatiel	LC				X	X		X		X	
<i>Platycercus varius</i>	Mulga Parrot	LC	X	X		X	X	X	X	X	X	
<i>Platycercus zonarius</i>	Australian Ringneck	LC	X	X	X	X	X	X	X	X	X	
<i>Polytelis alexandrae</i>	Princess Parrot	P4 VU NT										

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Class Family Species	Common Name	Conservation Status	GH 2015a	GH 2015b	GH 2015c	Rapallo 2015	KEC 2014	GH 2014	KLA 2012	GH 2011	ecologia 2009	DPaW 2015
Cuculidae												
Parasitic Cuckoos												
<i>Chrysococcyx basalis</i>	Horsfield's Bronze Cuckoo	LC			X		X			X	X	
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo	LC					X					X
<i>Cuculus pallidus</i>	Pallid Cuckoo	LC		X	X		X	X		X	X	
Strigidae												
Hawk Owls												
<i>Ninox novaeseelandiae</i>	Boobook Owl	LC				X	X		X			X
Tytonidae												
Barn Owls												
<i>Tyto alba</i>	Barn Owl	LC										
Podargidae												
Frogmouths												
<i>Podargus strigoides</i>	Tawny Frogmouth	LC			X		X		X		X	X
Caprimulgidae												
Nightjars												
<i>Eurostopodus argus</i>	Spotted Nightjar	LC			X	X	X	X	X		X	

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Class	Common	Conservation	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW
Family	Name	Status	2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
Species												
Aegothelidae												
Owlet-nightjars												
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	LC					X	X		X		X
Halcyonidae												
Tree Kingfishers												
<i>Todiramphus pyrrhopygia</i>	Red-backed Kingfisher	LC	X				X	X	X	X		X
Meropidae												
Bee-eaters												
<i>Merops ornatus</i>	Rainbow Bee-eater	S5 Mig JA LC	X					X				X
Climacteridae												
Trecreepers												
<i>Climacteris affinis</i>	White-browed Trecreeper	LC										X

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Class Family Species	Common Name	Conservation Status	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW
			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
Maluridae												
Fairy Wrens, GrassWrens												
<i>Amytornis striatus striatus</i>	Striated Grasswren	P4 LC						X				X
<i>Malurus lamberti</i>	Variiegated Fairy-wren	LC	X	X		X		X	X	X		X
<i>Malurus leucopterus</i>	White-winged Fairy-wren	LC	X	X	X		X			X		X
<i>Malurus splendens</i>	Splendid Fairy-wren	LC				X	X				X	
<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren	LC										

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Class Family Species	Common Name	Conservation Status	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW
			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
Acanthizidae												
Thornbills, Geryones, Fieldwrens & Whitefaces												
<i>Acanthiza apicalis</i>	Broad-tailed Thornbill	LC	X	X		X	X	X	X	X	X	X
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	LC	X				X		X		X	X
<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill	LC			X	X	X	X	X		X	X
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	LC	X				X	X	X	X	X	X
<i>Aphelocephala leucopsis</i>	Southern Whiteface	LC					X	X	X	X	X	X
<i>Gerygone fusca</i>	Western Gerygone	LC										
<i>Pyrrholaemus brunneus</i>	Redthroat	LC				X	X	X	X	X	X	X
<i>Smicrornis brevirostris</i>	Weebill	LC	X	X	X	X	X	X	X	X	X	X

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Class	Common	Conservation											
Family	Name	Status	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW	
Species			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015	
Pardalotidae													
Pardalotes													
<i>Pardalotus rubricatus</i>	Red-browed Pardalote	LC					X		X	X			X
<i>Pardalotus striatus</i>	Striated Pardalote	LC	X	X	X		X	X			X		X

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Class Family Species	Common Name	Conservation Status	GH 2015a	GH 2015b	GH 2015c	Rapallo 2015	KEC 2014	GH 2014	KLA 2012	GH 2011	ecologia 2009	DPaW 2015
Meliphagidae												
Honeyeaters, Chats												
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	LC	X	X	X	X	X	X	X	X	X	X
<i>Anthochaera carunculata</i>	Red Wattlebird	LC			X		X	X			X	X
<i>Certhionyx niger</i>	Black Honeyeater	LC										
<i>Certhionyx variegatus</i>	Pied Honeyeater	LC								X		
<i>Epthianura aurifrons</i>	Orange Chat	LC			X						X	
<i>Epthianura tricolor</i>	Crimson Chat	LC	X	X	X		X	X	X	X	X	X
<i>Lichenostomus plumulus</i>	Grey-fronted Honeyeater	LC	X		X	X	X	X			X	
<i>Lichenostomus virescens</i>	Singing Honeyeater	LC	X	X	X	X	X	X	X	X	X	
<i>Lichmera indistincta</i>	Brown Honeyeater	LC					X				X	
<i>Manorina flavigula</i>	Yellow-throated Miner	LC	X	X	X	X	X	X	X	X	X	X

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Class Family Species	Common Name	Conservation Status	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW
			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
<i>Phylidonyris albifrons</i>	White-fronted Honeyeater	LC		X	X		X	X		X	X	
Petroicidae Australian Robins												
<i>Microeca fascinans</i>	Jacky Winter	LC					X	X			X	X
<i>Petroica cucullata</i>	Hooded Robin	LC		X		X	X	X	X	X	X	
<i>Petroica goodenovii</i>	Red-capped Robin	LC	X	X	X	X	X	X	X	X	X	X
Pomatostomidae Babblers												
<i>Pomatostomus superciliosus</i>	White-browed Babbler	LC	X	X		X	X	X	X	X	X	X
Cinclosomatidae Whipbirds, Wedgebills, Quail Thrushes												
<i>Cinclosoma castaneothorax</i>	Chestnut-breasted Quail-thrush	LC				X		X	X			X
<i>Cinclosoma castanotus</i>	Chestnut Quail-thrush	LC					X					
<i>Psophodes occidentalis</i>	Chiming Wedgebill	LC										

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Class Family Species	Common Name	Conservation Status	GH 2015a	GH 2015b	GH 2015c	Rapallo 2015	KEC 2014	GH 2014	KLA 2012	GH 2011	ecologia 2009	DPaW 2015
Neosittidae												
Sitellas												
<i>Daphoenositta chrysoptera</i>	Varied Sittella	LC					X	X			X	
Pachycephalidae												
Crested Shrike-tit, Crested Bellbird, Shrike Thrushes, Whistlers												
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	LC			X	X	X	X	X	X	X	X
<i>Oreoica gutturalis</i>	Crested Bellbird	LC	X	X	X	X	X	X	X	X	X	X
<i>Pachycephala rufiventris</i>	Rufous Whistler	LC	X	X	X	X	X	X	X	X	X	X
Dicruridae												
Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo												
<i>Grallina cyanoleuca</i>	Magpie-lark	LC	X	X		X	X	X	X	X	X	X
<i>Rhipidura fuliginosa</i>	Grey Fantail	LC										
<i>Rhipidura leucophrys</i>	Willie Wagtail	LC	X	X	X	X	X	X	X	X	X	X

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Class Family Species	Common Name	Conservation Status	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW	
			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015	
Campephagidae													
Cuckoo-shrikes, Trillers													
<i>Coracina maxima</i>	Ground Cuckoo-shrike	LC		X			X			X	X	X	X
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	LC	X	X	X	X	X	X			X	X	X
<i>Lalage tricolor</i>	White-winged Triller	LC	X					X		X	X		
Artamidae													
Woodswallows, Butcherbirds, Currawongs													
<i>Artamus cinereus</i>	Black-faced Woodswallow	LC	X	X	X	X	X	X			X	X	X
<i>Artamus minor</i>	Little Woodswallow	LC					X	X					
<i>Artamus personatus</i>	Masked Woodswallow	LC					X	X		X	X	X	X

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Class Family Species	Common Name	Conservation Status	GH 2015a	GH 2015b	GH 2015c	Rapallo 2015	KEC 2014	GH 2014	KLA 2012	GH 2011	ecologia 2009	DPaW 2015
Cracticidae												
Currawongs, Magpies & Butcherbirds												
<i>Cracticus nigrogularis</i>	Pied Butcherbird	LC	X	X	X	X	X	X	X	X	X	X
<i>Cracticus tibicen</i>	Australian Magpie	LC	X	X	X	X	X	X	X	X	X	X
<i>Cracticus torquatus</i>	Grey Butcherbird	LC	X	X			X	X	X	X	X	X
<i>Strepera versicolor</i>	Grey Currawong	LC					X	X	X	X	X	X
Corvidae												
Ravens, Crows												
<i>Corvus bennetti</i>	Little Crow	LC	X	X	X	X	X	X	X		X	X
<i>Corvus orru</i>	Torresian Crow	LC	X			X	X	X	X	X		X
Ptilonorhynchidae												
Bowerbirds												
<i>Ptilonorhynchus maculatus</i>	Western Bowerbird	LC		X		X	X					
Motacillidae												
Old World Pipits, Wagtails												
<i>Anthus australis</i>	Australian Pipit	LC		X			X	X	X	X	X	

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Class Family Species	Common Name	Conservation Status	GH 2015a	GH 2015b	GH 2015c	Rapallo 2015	KEC 2014	GH 2014	KLA 2012	GH 2011	ecologia 2009	DPaW 2015
Estrilidae Grass Finches & Mannikins												
<i>Taeniopygia guttata</i>	Zebra Finch	LC	X	X	X	X	X	X	X	X	X	X
Dicaeidae Flowerpeckers												
<i>Dicaeum hirundinaceum</i>	Mistletoebird	LC					X			X	X	
Hirundinidae Swallows, Martins												
<i>Cheramoeca leucosternus</i>	White-backed Swallow	LC	X	X	X		X	X			X	
<i>Hirundo ariel</i>	Fairy Martin	LC				X	X					
<i>Hirundo neoxena</i>	Welcome Swallow	LC					X					
<i>Hirundo nigricans</i>	Tree Martin	LC				X	X				X	
Sylviidae Old World Warblers												
<i>Cincloramphus cruralis</i>	Brown Songlark	LC					X	X	X			
<i>Cincloramphus mathewsi</i>	Rufous Songlark	LC		X		X						

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Class	Common	Conservation	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW
Family	Name	Status	2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
Species												
Mammalia												
Tachyglossidae												
Echidnas												
<i>Tachyglossus aculeatus</i>	Echidna	LC	X	X		X	X			X	X	

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Class Family Species	Common Name	Conservation Status	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW
			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
Dasyuridae												
Carnivorous Marsupials												
<i>Antechinomys laniger</i>	Kultarr	LC										
<i>Dasycercus blythi</i>	Brush-tailed Mulgara	P4 LC					X					X
<i>Ningui ridei</i>	Wongai Ningui	LC				X						X
<i>Ningui yvonneae</i>	Southern Ningui	LC					X				X	
<i>Pseudantechinus macdonnellensis</i>	Fat-tailed Pseudantechinus	LC										X
<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart	LC									X	
<i>Sminthopsis dolichura</i>	Little long-tailed Dunnart	LC					X		X		X	X
<i>Sminthopsis hirtipes</i>	Hairy-footed Dunnart	LC				X	X				X	X
<i>Sminthopsis macroura</i>	Stripe-faced Dunnart	LC							X			X
<i>Sminthopsis ooldea</i>	Ooldea Dunnart	LC					X				X	X

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Class Family Species	Common Name	Conservation Status	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW
			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
Notoryctidae Marsupial Moles												
<i>Notoryctes typhlops</i>	Southern Marsupial Mole	P4	X					X				X
Macropodidae Kangaroos, Wallabies												
<i>Macropus fuliginosus</i>	Western Grey Kangaroo	LC	X		X	X	X	X				X
<i>Macropus robustus</i>	Euro	LC	X	X		X	X	X			X	X
<i>Macropus rufus</i>	Red Kangaroo	LC	X	X	X	X	X		X	X	X	
Emballonuridae Sheath-tailed Bats												
<i>Taphozous hilli</i>	Hill's Sheathtail-bat	LC										X
Molossidae Freetail Bats												
<i>Austronomus australis</i>	White-striped Freetail-bat	LC		X	X		X	X	X	X	X	X
<i>Ozimops petersi</i>	Inland Freetail-bat	LC					X		X		X	

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Class Family Species	Common Name	Conservation Status	GH 2015a	GH 2015b	GH 2015c	Rapallo 2015	KEC 2014	GH 2014	KLA 2012	GH 2011	ecologia 2009	DPaW 2015
Vespertilionidae												
Ordinary Bats												
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	LC					X	X		X		X
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	LC					X	X				X
<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat	LC					X			X		X
<i>Vespadelus baverstocki</i>	Inland Forest Bat	LC									X	
<i>Vespadelus finlaysoni</i>	Finlayson's Cave Bat	LC					X			X		X

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Class Family Species	Common Name	Conservation Status	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW
			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
Muridae Rats, Mice												
<i>Mus musculus</i>	House Mouse	Introduced					X	X		X		X
<i>Notomys alexis</i>	Spinifex Hopping-mouse	LC					X	X		X		X
<i>Pseudomys bolami</i>	Bolam's Mouse	LC										
<i>Pseudomys desertor</i>	Desert Mouse	LC						X		X		X
<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse	LC					X	X		X		X
Canidae Dogs, Foxes												
<i>Canis lupus</i>	Dingo/Dog	LC/Introduced				X	X	X			X	X
<i>Vulpes vulpes</i>	Red Fox	Introduced				X		X	X		X	X
Felidae Cats												
<i>Felis catus</i>	Cat	Introduced	X		X	X	X	X	X			X

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Class Family Species	Common Name	Conservation Status	GH	GH	GH	Rapallo	KEC	GH	KLA	GH	ecologia	DPaW
			2015a	2015b	2015c	2015	2014	2014	2012	2011	2009	2015
Equidae Horses												
<i>Equus caballus</i>	Horse	Introduced						X				X
Bovidae Horned Ruminants												
<i>Bos taurus</i>	European Cattle	Introduced	X	X	X	X	X		X	X		
<i>Capra hircus</i>	Goat	Introduced						X	X			
<i>Ovis aries</i>	Sheep	Introduced										
Camelidae Camels												
<i>Camelus dromedarius</i>	Camel	Introduced	X	X	X	X	X	X		X	X	
Leporidae Rabbits, Hares												
<i>Oryctolagus cuniculus</i>	Rabbit	Introduced	X	X	X	X	X	X	X	X	X	X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others

APPENDIX C

DPAW NATUREMAP & EPBC ACT DATABASE SEARCH RESULTS

NatureMap - Gruyere Borefield Project

Created By Greg Harewood on 04/12/2015

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 123°43' 29" E,28°03' 14" S
Buffer 40km
Group By Species Group

Species Group	Species	Records
Amphibian	7	42
Bird	63	349
Invertebrate	65	205
Mammal	17	318
Reptile	80	7033
TOTAL	232	7947

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Amphibian				
1.	25375 <i>Cyclorana maini</i> (Sheep Frog)			
2.	<i>Cyclorana</i> sp.			
3.	25422 <i>Neobatrachus aquilonius</i> (Northern Burrowing Frog)			
4.	25425 <i>Neobatrachus kunapalari</i> (Kunapalari Frog)			
5.	42303 <i>Neobatrachus sudellae</i> (Desert Trilling Frog)			
6.	25427 <i>Neobatrachus sutor</i> (Shoemaker Frog)			
7.	25430 <i>Notaden nicholli</i> (Desert Spadefoot)			
Bird				
8.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
9.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
10.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
11.	24264 <i>Acanthiza robustirostris</i> (Slaty-backed Thornbill)			
12.	24265 <i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
13.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
14.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
15.	25544 <i>Aegotheles cristatus</i> (Australian Owllet-nightjar)			
16.	25647 <i>Amytomis striatus</i> (Striated Grasswren)			
17.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
18.	25528 <i>Aphelocephala leucopsis</i> (Southern Whiteface)			
19.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
20.	24610 <i>Ardeotis australis</i> (Australian Bustard)			
21.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
22.	24356 <i>Artamus personatus</i> (Masked Woodswallow)			
23.	<i>Barnardius zonarius</i>			
24.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
25.	<i>Cheramoeca leucosterna</i>			
26.	25580 <i>Cinclosoma castaneothorax</i> (Chestnut-breasted Quail-thrush)			
27.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
28.	24361 <i>Coracina maxima</i> (Ground Cuckoo-shrike)			
29.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
30.	24416 <i>Corvus bennetti</i> (Little Crow)			
31.	25593 <i>Corvus orru</i> (Torresian Crow)			
32.	<i>Corvus</i> sp.			
33.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
34.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
35.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
36.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
37.	<i>Eolophus roseicapillus</i>			
38.	24570 <i>Epthianura tricolor</i> (Crimson Chat)			
39.	25621 <i>Falco berigora</i> (Brown Falcon)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
40.	25622 <i>Falco cenchroides</i> (Australian Kestrel)			
41.	25623 <i>Falco longipennis</i> (Australian Hobby)			
42.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
43.	24401 <i>Geopelia cuneata</i> (Diamond Dove)			
44.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
45.	25651 <i>Malurus lamberti</i> (Variegated Fairy-wren)			
46.	25652 <i>Malurus leucopterus</i> (White-winged Fairy-wren)			
47.	<i>Manorina (Myzantha) flavigula</i>			
48.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
49.	24736 <i>Melopsittacus undulatus</i> (Budgerigar)			
50.	25693 <i>Microeca fascinans</i> (Jacky Winter)			
51.	24740 <i>Neophema splendida</i> (Scarlet-chested Parrot)			
52.	25748 <i>Ninox novaeseelandiae</i> (Boobook Owl)			
53.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
54.	24618 <i>Oreocia gutturalis</i> (Crested Bellbird)			
55.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
56.	24627 <i>Pardalotus rubricatus</i> (Red-browed Pardalote)			
57.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
58.	24630 <i>Pardalotus striatus</i> subsp. <i>westraliensis</i> (Striated Pardalote)			
59.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
60.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
61.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
62.	24683 <i>Pomatostomus superciliosus</i> (White-browed Babbler)			
63.	42342 <i>Ptilotula plumulus</i> (Grey-fronted Honeyeater)			
64.	42344 <i>Pumella albigrons</i> (White-fronted Honeyeater)			
65.	24278 <i>Pyrrholaemus brunneus</i> (Redthroat)			
66.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
67.	30948 <i>Smicrornis brevirostris</i> (Weebill)			
68.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
69.	30870 <i>Taeniopygia guttata</i> (Zebra Finch)			
70.	24851 <i>Turnix velox</i> (Little Button-quail)			

Invertebrate

71.	<i>Acariformes</i> sp.
72.	<i>Acrophylla nubilosa</i>
73.	<i>Argiope protensa</i>
74.	<i>Asadipus auld</i>
75.	<i>Austracantha minax</i>
76.	<i>Austrogymnocnemia bipunctata</i>
77.	<i>Backbourkia collina</i>
78.	<i>Backbourkia heroine</i>
79.	<i>Calomyrmex</i> sp.
80.	<i>Camponotus perjurus</i>
81.	<i>Camponotus</i> sp.
82.	<i>Cardiocondyla nuda</i>
83.	<i>Cavasteron crassicalcar</i>
84.	<i>Cerapachys</i> sp.
85.	<i>Dingosa humphreysi</i>
86.	<i>Drepanotermes columellaris</i>
87.	<i>Drepanotermes diversicolor</i>
88.	<i>Drepanotermes gayi</i>
89.	<i>Drepanotermes rubriceps</i>
90.	<i>Eretes australis</i>
91.	<i>Ethmostigmus curtipes</i>
92.	<i>Hoggicosa alfi</i>
93.	<i>Hoggicosa bicolor</i>
94.	<i>Hoggicosa forresti</i>
95.	<i>Holconia nigrigularis</i>
96.	<i>Iridomyrmex chasei</i>
97.	<i>Iridomyrmex difficilis</i>
98.	<i>Iridomyrmex discors</i>
99.	<i>Iridomyrmex hartmeyeri</i>
100.	<i>Iridomyrmex purpureus</i>
101.	<i>Iridomyrmex roseatus</i>
102.	<i>Iridomyrmex</i> sp.
103.	<i>Isopedella saundersi</i>
104.	<i>Isopedella tindalei</i>
105.	<i>Lamponina elongata</i>
106.	<i>Lamponina scutata</i>
107.	<i>Lycosa australicola</i>
108.	<i>Lycosa woonda</i>

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
109.	<i>Masasteron piankai</i>			
110.	<i>Melophorus</i> sp.			
111.	<i>Meranoplus</i> sp.			
112.	<i>Merimna atrata</i>			
113.	<i>Minasteron minusculum</i>			
114.	<i>Molycrta vokes</i>			
115.	<i>Monomorium</i> sp.			
116.	<i>Neostenus</i> sp.			
117.	<i>Nephila edulis</i>			
118.	<i>Odontomachus ruficeps</i>			
119.	<i>Odontomachus</i> sp.			
120.	<i>Orthetrum caledonicum</i>			
121.	<i>Pediana horni</i>			
122.	<i>Podomyrma</i> sp.			
123.	<i>Polyrhachis</i> sp.			
124.	<i>Rhytidoponera</i> sp.			
125.	<i>Storena sinuosa</i>			
126.	<i>Synothele meadhunteri</i>			
127.	<i>Tamopsis marri</i>			
128.	<i>Thereuopoda lesueurii</i>			
129.	<i>Trichocyclus arabana</i>			
130.	<i>Tumulitermes tumuli</i>			
131.	<i>Urodacus hoplurus</i>			
132.	<i>Venator yalkara</i>			
133.	<i>Wandella stuartensis</i>			Y
134.	<i>Wyndura kennedy</i>			
135.	<i>Wyndura uluru</i>			

Mammal

136.	24086	<i>Cercartetus concinnus</i> (Western Pygmy-possum, <i>Mundarda</i>)		
137.	30903	<i>Dasymercus blythi</i> (Brush-tailed Mulgara, <i>Ampurta</i>)		P4
138.	24258	<i>Equus caballus</i> (Horse)	Y	
139.	24135	<i>Macropus robustus</i> subsp. <i>erubescens</i> (Euro, <i>Biggada</i>)		
140.	24223	<i>Mus musculus</i> (House Mouse)	Y	
141.	24094	<i>Ningai ridei</i> (Wongai Ningai)		
142.	24224	<i>Notomys alexis</i> (<i>Spinifex</i> Hopping-mouse)		
143.	24229	<i>Notomys mitchellii</i> (Mitchell's Hopping-mouse)		
144.	24085	<i>Oryctolagus cuniculus</i> (Rabbit)	Y	
145.	24103	<i>Pseudantechinus macdonnellensis</i> (Fat-tailed <i>Pseudantechinus</i>)		
146.	24235	<i>Pseudomys desertor</i> (Desert Mouse)		
147.	24237	<i>Pseudomys hermannsburgensis</i> (Sandy Inland Mouse)		
148.	24243	<i>Rattus fuscipes</i> (Western Bush Rat)		
149.	24109	<i>Sminthopsis dolichura</i> (Little long-tailed Dunnart)		
150.	24114	<i>Sminthopsis hirtipes</i> (Hairy-footed Dunnart)		
151.	24116	<i>Sminthopsis macroura</i> (Stripe-faced Dunnart)		
152.	24117	<i>Sminthopsis ooldea</i> (Ooldea Dunnart)		

Reptile

153.	30833	<i>Amphibolurus longirostris</i> (Long-nosed Dragon)		
154.	25319	<i>Antaresia stimsoni</i> subsp. <i>orientalis</i> (Stimson's Python)		
155.	42374	<i>Brachyuropis fasciolatus</i> subsp. <i>fasciatus</i> (Narrow-banded Shovel-nosed Snake)		
156.	42381	<i>Brachyuropis semifasciatus</i> (Southern Shovel-nosed Snake)		
157.	25458	<i>Ctenophorus caudicinctus</i> (Ring-tailed Dragon)		
158.	24867	<i>Ctenophorus caudicinctus</i> subsp. <i>infans</i> (Ring-tailed Dragon)		
159.	24868	<i>Ctenophorus clayi</i> (Collared Dragon)		
160.	24873	<i>Ctenophorus fordii</i> (Mallee Sand Dragon)		
161.	25459	<i>Ctenophorus isolepis</i> (Crested Dragon, Military Dragon)		
162.	24875	<i>Ctenophorus isolepis</i> subsp. <i>gularis</i> (Central Military Dragon)		
163.	24882	<i>Ctenophorus nuchalis</i> (Central Netted Dragon)		
164.	24884	<i>Ctenophorus pictus</i> (Painted Dragon)		
165.	24886	<i>Ctenophorus reticulatus</i> (Western Netted Dragon)		
166.	24889	<i>Ctenophorus scutulatus</i> (Lozenge-marked Dragon)		
167.		<i>Ctenophorus</i> sp.		
168.	25025	<i>Ctenotus ariadnae</i>		
169.	25461	<i>Ctenotus brooksi</i>		
170.	25032	<i>Ctenotus calurus</i>		
171.	25037	<i>Ctenotus dux</i>		
172.	25041	<i>Ctenotus grandis</i> subsp. <i>grandis</i>		
173.	25042	<i>Ctenotus greeri</i>		
174.	25044	<i>Ctenotus hanloni</i>		
175.	25045	<i>Ctenotus helenae</i>		

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
176.	25050	<i>Ctenotus leae</i>		
177.	25052	<i>Ctenotus leonhardii</i>		
178.	25057	<i>Ctenotus nasutus</i>		
179.	25064	<i>Ctenotus pantherinus</i> subsp. <i>ocellifer</i> (Leopard Ctenotus)		
180.	25062	<i>Ctenotus piankai</i>		
181.	25066	<i>Ctenotus quattuordecimlineatus</i>		
182.	25074	<i>Ctenotus schomburgkii</i>		
183.	25090	<i>Cyclodomorphus melanops</i> subsp. <i>melanops</i> (Slender Blue-tongue)		
184.	24997	<i>Delma butleri</i>		
185.	25001	<i>Delma nasuta</i>		
186.	25247	<i>Demansia psammophis</i> subsp. <i>psammophis</i> (Yellow-faced Whipsnake)		
187.	24926	<i>Diplodactylus conspicillatus</i> (Fat-tailed Gecko)		
188.	24940	<i>Diplodactylus pulcher</i>		
189.	42401	<i>Diporiphora paraconvergens</i> (Grey-striped Western Desert Dragon)		
190.	25109	<i>Eremiascincus richardsonii</i> (Broad-banded Sand Swimmer)		
191.	24957	<i>Gehyra purpurascens</i>		
192.	24959	<i>Gehyra variegata</i>		
193.	24961	<i>Heteronotia binoei</i> (Bynoe's Gecko)		
194.	25125	<i>Lerista bipes</i>		
195.	25130	<i>Lerista desertorum</i>		
196.		<i>Lerista</i> sp.		
197.	25005	<i>Lialis burtonis</i>		
198.	41411	<i>Liopholis inornata</i> (Desert Skink)		
199.	41417	<i>Liopholis striata</i> (Night Skink)		
200.	41420	<i>Lucasium bungabinna</i> (Southern Sand Plain Gecko)		
201.	30938	<i>Lucasium damaeum</i>		
202.	30933	<i>Lucasium stenodactylum</i>		
203.	25184	<i>Menetia greyii</i>		
204.	24904	<i>Moloch horridus</i> (Thorny Devil)		
205.	25190	<i>Morethia butleri</i>		
206.	25248	<i>Neelaps bimaculatus</i> (Black-naped Snake)		
207.	24966	<i>Nephurus laevisimus</i>		
208.	24971	<i>Nephurus vertebralis</i>		
209.	25254	<i>Parasuta monachus</i>		
210.	24907	<i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)		
211.	25261	<i>Pseudechis australis</i> (Mulga Snake)		
212.	42416	<i>Pseudonaja mengdeni</i> (Western Brown Snake)		
213.	25263	<i>Pseudonaja modesta</i> (Ringed Brown Snake)		
214.	25009	<i>Pygopus nigriceps</i>		
215.	24982	<i>Rhynchoedura ornata</i> (Western Beaked Gecko)		
216.	25305	<i>Simoselaps anomalus</i> (Desert Banded Snake)		
217.	25266	<i>Simoselaps bertholdi</i> (Jan's Banded Snake)		
218.	24924	<i>Strophurus ciliaris</i> subsp. <i>aberrans</i>		
219.	24927	<i>Strophurus elderi</i>		
220.	24931	<i>Strophurus intermedius</i>		
221.	24946	<i>Strophurus strophurus</i>		
222.	25269	<i>Suta fasciata</i> (Rosen's Snake)		
223.	25202	<i>Tiliqua multifasciata</i> (Central Blue-tongue)		
224.	25203	<i>Tiliqua occipitalis</i> (Western Bluetongue)		
225.	30814	<i>Tympanocryptis cephalus</i> (Pebble Dragon)		
226.	25210	<i>Varanus brevicauda</i> (Short-tailed Pygmy Monitor)		
227.	25211	<i>Varanus caudolineatus</i>		
228.	25212	<i>Varanus eremius</i> (Pygmy Desert Monitor)		
229.	25216	<i>Varanus giganteus</i> (Perentie)		
230.	25215	<i>Varanus gilleani</i> (Pygmy Mulga Monitor)		
231.	25218	<i>Varanus gouldii</i> (Bungarra or Sand Monitor)		
232.	25526	<i>Varanus tristis</i> (Racehorse Monitor)		

Conservation Codes

- T - Rare or likely to become extinct
- X - Presumed extinct
- IA - Protected under international agreement
- S - Other specially protected fauna
- 1 - Priority 1
- 2 - Priority 2
- 3 - Priority 3
- 4 - Priority 4
- 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 04/12/15 17:14:00

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

**No Image
Available**

This map may contain data which are
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[Coordinates](#)

[Buffer: 0.0Km](#)

No Image
Available

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	4
Listed Migratory Species:	5

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	5
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	5
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area
Mammals		
Sminthopsis psammophila Sandhill Dunnart [291]	Endangered	Species or species habitat may occur within area
Reptiles		
Liopholis kintorei Great Desert Skink, Tjakura, Warrarna, Mulyamiji [83160]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Terrestrial Species		
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area

Extra Information

Invasive Species		[Resource Information]
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.		
Name	Status	Type of Presence
Mammals		
Camelus dromedarius		
Dromedary, Camel [7]		Species or species habitat likely to occur within area
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus		
House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species

Name

Status

Type of Presence
habitat likely to occur within
area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-28.054 123.72496

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Parks and Wildlife Commission NT, Northern Territory Government](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence
Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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APPENDIX D

SIGNIFICANT SPECIES PROFILES

Buff-snouted Blind Snake *Anilius margaretae*

Status and Distribution: This species is listed as Priority 2 by DPaW. Limited number of records. Original specimen was collected at Lake Throssel in 1962 (~77 km north east of Gruyere). Since this time it has been recorded at two other locations in WA, these being Neale Junction Nature Reserve (~200km south east - 2008) and south of Neale Junction Nature Reserve (~ 200k south south east – 2011) (DPaW 2015b), and twice in South Australia over 700 km away (Maralinga – 2010 and Oak Valley School – 2012) (Atlas of Living Things 2015), indicating a wide distribution across the Great Victoria Desert. Not recorded during Level 2 fauna surveys at Yamarna (KLA 2012) or Gruyere (Rapallo 2015).

Habitat: Recorded in playa and sheoak (*Casuarina cristata*) habitat associated with Lake Throssell while to the south the blind snake was recorded in *Acacia* shrublands on the border of tree and shrub steppe between sandhills and sandplains (MBS 2014). Like other blind snakes this is a burrowing worm-like snake that feeds mostly on the larvae and pupae of ants and termites.

Likely presence in survey area: The status of this species in the survey area is difficult to determine. Given suitable habitat (i.e. sand dunes and sand plains) occurs its presence cannot be discounted despite not being recorded during previously fauna surveys nearby and in the wider area (ecologia 2009, KLA 2012, KEC 2014 and Rapallo 2015). While there are limited records for this species, it appears to have a wide distribution across the Great Victoria Desert. The lack of records could be attributed to the areas remoteness and the secretive habits of blind snakes and it may in fact be more common than records indicate.

Extent of potential habitat within the survey area: Sand plains and sand dunes (4,791 ha - ~80.1% of total area).

Great Desert Skink *Liopholis kintorei*

Status and Distribution: This species is listed as Schedule 3 under the *WC Act* and as Vulnerable under the *EPBC Act*. The species appears to have occurred in widespread, but connected, populations in the past in the Great Sandy, Gibson, Great Victoria and Tanami Deserts in the eastern interior of WA and adjacent areas in south-western NT and northwestern SA.

The reported distribution consists of but is not limited to seven isolated populations. Three populations occur in WA at Patjarr (population estimated to be less than 2500 individuals), near the Kiwirrkura community, including the vicinity of Lake Mackay (<500 individuals), and in Rudal River NP (unknown population size). Populations also occur in the NT in the Tanami Desert, including Rabbit Flat, Sangster's Bore, The Granites and near Kintore, (< 2250 individuals); in Uluru - Kata Tjuta NP including part of the Yulara borefields (< 500 individuals); and in the Yulara lease

lands including part of the Yulara borefields (< 350 individuals). Only one population is known to persist in SA, near Watarru on the Anangu-Pitjantjatjara Lands (< 50 individuals) (McAlpin 2001).

Habitat: Arid sand flats and clay based loamy soils vegetated with spinifex (Wilson and Swan 2013). The species generally occurs on red sandplains and sand ridges (Cogger *et al.* 1993). Populations in the Gibson Desert occur on sandplains with a surface cover of fine gravel (Pearson *et al.* 2001). Vegetation usually consists of hummock grassland (*Triodia basedowii*, *T. pungens* and *T. schinzii*), with some scattered shrubs and occasional trees (e.g. *Acacia spp.*, *Eucalyptus spp.*, *Hakea spp.*, *Grevillea spp.* and *Allocasuarina decaisneana*) (Cogger *et al.* 1993, McAlpin 2001).

Likely presence in survey area: No evidence of the distinctive burrows or associated scat latrines made by this species were observed during the field survey or during more detailed fauna surveys nearby or in the wider area (ecologia 2009, KLA 2012, KEC 2014 and Rapallo 2015).

Habitat in some sections of the survey area does appear superficially suitable (sand plains and sand dunes vegetated with spinifex) and the site falls within the historical range of the species but a lack of actual records from the immediate vicinity suggest the probability of the species being present is very low.

Closest DPaW records are from ~100 west of Laverton in 1967 and south of Warburton (275 km north east of Gruyere) in 1963. The closest, more recent records are from the Gibson Desert Nature Reserve (370 km north, north east of Gruyere) in 1997 (DPaW 2015b). Available evidence therefore suggests this species is locally extinct despite the presence of apparently suitable habitat.

Not considered a potential species based on currently available information.

Extent of potential habitat within the survey area: Sand plains and sand dunes (4,791 ha - ~80.1% of total area).

Woma Aspidites ramsayi

Status and Distribution: The south western population is classified as Priority 1 by DPaW. The species as a whole is known from four potentially disjunct populations - Southwestern: Yuna, Wialki & Menzies south to Boddington; Narembeen & Marvel Loch and east to western edge of Nullarbor Plain. Peron Peninsula. Arid northwestern: of Eighty-Mile Beach, west to Mundabullangana. Central: Tanami Desert in WA & arid E Australia. Womas were formally abundant in southwestern sandplain habitats, but the few more recent records come from widely scattered localities in the wheatbelt and are old adults (Storr *et al.* 2002).

Habitat: Woodlands, heaths and shrublands, often with spinifex (Wilson and Swan 2013). A nocturnal, terrestrial snake which shelters in hollow logs, animal burrows or thick herbage during the day. Feeds on small mammals, ground birds and reptiles (Cogger 2014). The Woma occurs in a variety of arid sandplain habitats including desert sandplain and dune systems and is strongly associated with red desert sandplains supporting spinifex hummock grasslands (Maryan 2002).

Likely presence in survey area: Outside current documented range. Closest DPaW are from Kookynie and Kitchener, well away from the survey area (DPaW 2015b). Not recorded during any recent surveys at or near Laverton, Yamarna or Tropicana (ecologia 2009, TE 2011, KLA 2012, KEC 2014 and Rapallo 2015). Yilka Traditional Owners (Harvey Murray (HM) and Harvey Murry (HJ)) recently stated that they have never seen this species in this area. Available evidence therefore suggests this species is locally extinct despite the presence of apparently suitable habitat.

Not considered a potential species based on currently available information.

Extent of potential habitat within the survey area: Sand plains and sand dunes (4,791 ha - ~80.1% of total area).

Malleefowl *Leipoa ocellata*

Status and Distribution: This species is listed as Schedule 3 under the *WC Act* and as Vulnerable under the *EPBC Act*. Originally common, but now generally rare to uncommon and patchily distributed.

Current distribution mainly southern arid and semi-arid zones, north to Shark Bay, Jingemarra, Colga Downs and Yeelirrie, east to Earnest Giles Range, Yeo Lake, lower Ponton Creek and to Eucla and west and south to Cockleshell Gully, the Wongan Hills, Stirling Range, Beaufort Inlet, Hatters Hill, Mt Ragged and Point Malcolm (Johnstone and Storr 1998).

Habitat: Mainly scrubs and thickets of mallee *Eucalyptus* spp., boree *Melaleuca lanceolata* and bowgada *Acacia linophylla*, dense litter forming shrublands and dense mulga woodland.

Likely presence in survey area: No evidence of this species (individuals, foot prints, feathers or recent/old nest mounds) was observed during the survey period. Habitat appears unsuitable or at best marginal within much of the area surveyed primarily due to the generally sparse nature of the vegetation, recent fires and/or a lack of leaf litter.

Individual malleefowl have very occasionally been observed in the general vicinity of Yamarna (pers. comms. "Driller" and TOs) but no recent active or inactive mounds have ever been recorded despite several fauna and flora surveys over significant

areas of land associated with the proposed mining operations. This would suggest that the habitats present are unsuitable for breeding and that the observations made are of transient individuals.

A single old abandoned nest mound has previously been observed within the Yamarna Project area several years ago (pers. comm. Jim Williams) though its actual age and exact location are unclear.

Malleefowl and malleefowl mounds have also been recorded further south at Tropicana and at the eastern end of Tropicana to Sunrise Dam pipeline route (KEC 2014).

At this stage listed as a potential species due to possibility for occasional transient individuals to occur but considered unlikely to breed in the survey area.

Extent of potential habitat within the survey area: Vegetated clay loam plains, sand loam plains, drainage depressions and quartz rocky plains (926 ha - ~15.5% of total area). Most habitat does however appear marginal in quality at best.

Great Egret *Ardea alba*

Status and Distribution: This species of egret is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. The great egret is common and very widespread in any suitable permanent or temporary habitat (Morcombe 2004).

Habitat: Wetlands, flooded pasture, dams, estuarine mudflats, mangroves and reefs (Morcombe 2004).

Likely presence in survey area: Very rarely recorded in this general area. Suitable habitat limited to depressions when inundated.

Not listed as a potential species based on currently available information.

Extent of potential habitat within the survey area: Drainage depressions and closed depressions when inundated (429 ha - ~7.1% of total area). Most habitat does however appear marginal in quality at best.

Peregrine Falcon *Falco peregrinus*

Status and Distribution: This species is listed as Schedule 7 under the *WC Act*. Individuals of this species are uncommon/rare but wide ranging across Australia. Moderately common at higher levels of the Stirling Range, uncommon in hilly, north west Kimberley, Hamersley and Darling Ranges; rare or scarce elsewhere (Johnstone and Storr 1998).

Habitat: Diverse from rainforest to arid shrublands, from coastal heath to alpine (Morcombe 2004). Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes (Johnstone and Storr 1998). The species utilises the ledges, cliff faces and large hollows/broken spouts of trees for nesting. It will also occasionally use the abandoned nests of other birds of prey. Also known to utilise decommissioned open cut pit walls for nesting.

Likely presence in survey area: The species potentially utilises some sections of the survey area as part of a much larger home range for foraging purposes only. Would only be represented by a very small number of individuals for limited periods. Previously recorded at Tropicana (ecologia 2009).

Extent of potential habitat within the survey area: Foraging habitat - sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains (5,983 ha – 100% of total area). Breeding habitat - Large trees with open spouts suitable for nesting or abandoned bird of prey nests – total number unknown, but none observed during field survey.

Grey Falcon *Falco hypoleucos*

Status and Distribution: Listed as Schedule 3 under the *WC Act*. Within WA found in the northern half south to about 26°S (Gascoyne, Lake Carnegie and Warburton), casual further south (Johnstone and Storr 1998).

Habitat: Lightly treed plains, gibber deserts, sand ridges, pastoral lands, timbered water courses but seldom in driest deserts (Pizzey & Knight 2012). It has a distribution centred around ephemeral or permanent drainage lines, utilising old nests of other bird species situated in the tallest trees along the river systems (Garnett and Crowley 2000).

Likely presence in survey area: The survey area is just outside this species current main documented range though it has been recorded near Murrin Murrin and near Salt Creek (60 km south-east of Tropicana). This paucity of previous records and the lack of tree-lined watercourses within the survey area itself would suggest that grey falcons would only occur as nonbreeding, irregular visitors.

May occur very occasionally but not listed as a potential species.

Extent of potential habitat within the survey area: Foraging habitat - sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains (5,983 ha – 100% of total area). No suitable breeding habitat apparent.

Oriental Plover *Charadis veredus*

Status and Distribution: The oriental plover is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. Breeds in Mongolia and Manchuria – regular summer migrant to Australia (September to March) (Pizzey & Knight 2012). Kimberley, north western interior (Lake Gregory) and north west coastal plains (south to tropic); casual or vagrant elsewhere (south to 32°15'S) (Johnstone and Storr 1998).

Habitat: Mainly sparsely vegetated plains including samphire and short grasses flats. Also beaches, tidal flats, salt works and sewage ponds (Johnstone and Storr 1998).

Likely presence in survey area: This species would only occur in the general area as a casual/vagrant on very rare occasions at best.

Not listed as a potential species based on currently available information.

Extent of potential habitat within the survey area: Closed depressions (with chenopods) (76 ha - ~1.3 % of total area). Habitat does however appear marginal in quality at best.

Princess Parrot *Polytelis alexandrae*

Status and Distribution: This species is listed as Priority 4 by the DPaW and as Vulnerable under the *EPBC Act*. Rare, highly nomadic (Pizzey & Knight 2012). Found in the eastern deserts north to the Edgar Ranges, west to the Gregory Range, Well 18, Mt Bates, Lake Throssell and Mt Luck and south to Queen Victoria Spring and Carlisle Lakes, casual further north (Fossil Downs, Bohemia Downs) and west (head of Gascoyne, head of the Murchison, Wiluna, Wanjarri, Sandstone, Laverton, Kookynie, Menzies, Kanowna). Also deserts of eastern Australia (Johnstone and Storr 1998).

Habitat: Arid shrubland, particularly mulga, Desert Oak and Spinifex country including trees along watercourses (Simpson and Day 2010). The princess parrot inhabits sand dunes and sand flats supporting open woodlands and shrublands that usually consist of scattered stands of *Eucalyptus* (including *E. gongylocarpa* and mallee species), *Casuarina* or *Allocasuarina* trees and an understorey of shrubs such as *Acacia* (especially *A. aneura*), *Senna*, *Eremophila*, *Grevillea*, *Hakea* and a ground cover dominated by *Triodia* species (DotE 2013).

Likely presence in survey area: The species may frequent the survey area at times, but given it is highly nomadic, its frequency of occurrence would be very low and generally temporary. Areas containing *Eucalyptus gongylocarpa* woodland are of

most significance as they have the potential to contain larger trees with hollows that may represent potential breeding habitat.

Extent of potential habitat within the survey area: Foraging habitat – Vegetated sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains (5,983 ha – 100% of total area). Breeding habitat - Large trees with hollows suitable for nesting – total number, if any, unknown.

Night Parrot *Pezoporus occidentalis*

Status and Distribution: This species is listed as Schedule 1 under the *WC Act* and as Endangered under the *EPBC Act*. Historical evidence indicates that night parrots were distributed over much of semi-arid and arid Australia (Garnett and Crowley 2000). Extremely secretive and hard to flush, in WA there are only three accepted records of night parrots since 1935, all from the Pilbara region (1979, 1980 and 2005; DotE 2015). The most recent record is from Minga Well (35 km north east of Marillana) during a fauna survey at Fortescue Metals Group's Cloudbreak lease (Bamford 2005).

Habitat: Preferred habitat is thought to be spinifex grasslands or samphire and chenopod shrublands on claypans, floodplains or the margins of salt lakes, creeks or other water bodies (Johnstone and Storr 1998; Higgins 1999; DotE 2015).

Likely presence in survey area: There are no recent records of this species in the area and it is generally accepted as being locally and possibly regionally extinct despite the presence of apparently suitable habitat.

Not listed as a potential species based on currently available information.

Extent of potential habitat within the survey area: Vegetated sand plains, closed depression (with chenopods) (4,615 ha – 77.2 % of total area).

Fork-tailed Swift *Apus pacificus*

Status and Distribution: The fork-tailed swift is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. It is a summer migrant (Oct-Apr) to Australia (Morcombe 2004).

Habitat: Low to very high airspace over varied habitat from rainforest to semi desert (Morcombe 2004).

Likely presence in survey area: It is potentially a very occasional summer visitor to the survey area but is entirely aerial and largely independent of terrestrial habitats.

Not listed as a potential species given it would only occur very rarely and then only for short periods.

Extent of potential habitat within the survey area: Foraging habitat – almost totally aerial and therefore any section of the survey area - sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains (5,983 ha – 100% of total area). Breeding habitat – absent (0%).

Rainbow Bee-eater *Merops ornatus*

Status and Distribution: This species is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. The rainbow bee-eater is a common summer migrant to southern Australia but in the north they are resident (Morcombe 2004).

Habitat: Open country, of woodlands, open forest, semi arid scrub, grasslands, clearings in heavier forest, farmlands (Morcombe 2004). Breeds underground in areas of suitable soft soil firm enough to support tunnel building. Nest is a burrow usually dug at a slight angle in flat ground, sometimes into sandy banks or cuttings and often on margins of roads and tracks (Johnstone and Storr 1998).

Likely presence in survey area: Observed/heard on several occasions during survey period. The rainbow bee-eater is a very common and widespread seasonal visitor to the southern half of WA and would not be specifically attracted to the site. Some potential for the species to breed in some sections of the survey area where ground conditions are suitable. Population levels would however not be significant as it usually breeds in pairs and rarely in small colonies (Johnstone and Storr, 1998).

Extent of potential habitat within the survey area: Foraging habitat - sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains (5,983 ha – 100% of total area). Breeding habitat - sand plains and sand dunes (4,791 ha - ~80.1% of total area).

Striated Grasswren (sandplain) *Amytornis striatus striatus*

Status and Distribution: This sub-species is listed as Priority 4 by DPaW. Found in the eastern deserts between lats.20° and 28°39'S (north to Sahara Track and Well 48 and including much of Great Sandy, Gibson and Great Victoria Deserts), west to Eriston and south to 39 km ENE of Laverton, 27 km S of Neale Junction and the Serpentine Lakes, with an apparently isolated population between Meekatharra and Wiluna and another near Queen Victoria Spring (Johnstone and Storr 1998).

Habitat: Mainly spinifex, with or without low shrubs (especially *Thryptomene maisonneuvei*) and herbage, on sandy or loamy plains; also bushy acacias

(especially *A. ligulata* and *A. aneura*) on sandridges and interdunes, usually with spinifex (Johnstone and Storr 1998).

Likely presence in survey area: Not observed during the field survey or during any other recent survey at Yamarna however there is a NatureMap record along the Anne Beadell Highway just east of the borefield survey area made in the year 2000 (DPaW 2015b) and therefore it is considered to be a potential species where suitable habitat occurs. This species has also been recorded recently much further south at several locations along the Tropicana to Sunrise Dam pipeline route (KEC 2014).

Extent of potential habitat within the survey area: Sand plains, sand dunes, clay loam plains and sand loam plains (5,047 ha – 84.4% of total area).

Thick-billed Grass-wren (western ssp) *Amytornis textilis textilis*

Status and Distribution: Listed as Priority 4 by DPaW. Historically, the 'western' thick-billed grasswren was found in the Shark Bay area, including Peron Peninsula and Dirk Hartog Island, at Wongan Hills, east of Broomehill, between Beverley and Narembeen, Mt Magnet, Lake Austin, Lake Way and Lake Violet, Yalgoo, Kalgoorlie and Laverton. There is some doubt as to the extent of the thick-billed grasswren's former distribution over the Nullarbor Plain. Currently restricted to the Shark Bay region including Peron Peninsula and the nearby pastoral stations of Nanga, Hamelin, Woodleigh and Carbla (Cale 2000).

Habitat: Occurs in acacia-dominated shrublands, dense shrub associations in drainage depressions, and *Triodia* spinifex with acacia shrubland components. All these habitats feature recumbent shrubs where the foliage extends to the ground. In acacia-dominated shrublands, shrub clumps of high foliage density appear important determinants of thick-billed grasswren presence. These shrub clumps may provide the thick-billed grasswren with ideal nesting sites (Cale 2000).

Likely presence in survey area: This species has not been recorded in this general area for over 100 years and is therefore considered to be locally and regionally extinct despite the presence of some apparently suitable habitat (shrublands).

Not considered a potential species based on currently available information.

Extent of potential habitat within the survey area: Densely vegetated sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains (5,983 ha – 100% of total area). Many areas may however be marginal due to lack of dense shrubs.

Grey Wagtail *Motacilla cinerea*

Status and Distribution: The grey wagtail is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. A rarely recorded, accidental vagrant that has on a few occasions been recorded on widely separated parts of the Australian coastline (Pizzey & Knight 2012).

Habitat: In Australia, near running water in disused quarries, sandy, rocky streams in escarpments and rainforest, sewerage ponds, ploughed fields and airfields (Pizzey & Knight 2012).

Likely presence in survey area: This species preferred habitat is absent from the survey area and under normal circumstances it would not occur.

Not listed as a potential species based on currently available information.

Extent of potential habitat within the survey area: No habitat suitable for this species to utilise appears to be present.

Yellow Wagtail *Motacilla flava*

Status and Distribution: The yellow wagtail is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. A regular summer migrant to mostly coastal northern Australia, vagrant in southern Australia (Pizzey & Knight 2012).

Habitat: Habitat requirements for the yellow wagtail are highly variable, but typically include open grassy flats near water. Habitats include open areas with low vegetation such as grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms, sometimes utilise tidal mudflats and edges of mangroves (Pizzey & Knight 2012).

Likely presence in survey area: This species preferred habitat is absent from the survey area and under normal circumstances it would not occur.

Not listed as a potential species based on currently available information.

Extent of potential habitat within the survey area: No habitat suitable for this species to utilise appears to be present.

Brush-tailed Mulgara *Dasycercus blythi*

Status and Distribution: Listed as Priority 4 by the DPaW. Because most previous records did not distinguish among the two species of mulgara now recognised (i.e.

brush-tailed and crest-tailed), there is some ambiguity about the distribution of both species. Widespread but patchy in sandy regions of arid central Australia and WA. Has declined in the south and east of range (Menkhorst & Knight 2011).

Habitat: The brush-tailed mulgara occur in a range of vegetation types including hummock grass plains, sand ridges, mulga shrubland on loamy sand, however, the principal habitat is mature hummock grasslands of spinifex, especially *Triodia basedowii* and *T. pungens* where it lives in burrows that it digs on the flats between low sand dunes (Van Dyck & Strahan 2008). The location of brush-tailed mulgara colonies may be influenced by the presence of better watered areas such as paleo-drainage systems or drainage lines in sand plain or sand dune habitats (Masters *et al.* 2003).

Likely presence in survey area: There is a paucity of records of this species in the area and no evidence of its presence was observed during the field survey or any previous survey at Yamarna including those where trapping has been employed (KLA 2012 and Rapallo 2015). The current status in the survey area is therefore difficult to determine. The most recent nearby records are just south west of Yamarna from 1990 (DPaW 2015) and it was also recorded at several locations along the Tropicana to Sunrise Dam pipeline route (KEC 2014). This information coupled with the fact that habitat in some sections of the survey area appears suitable (e.g. sand plains, sand ridges, *Acacia* shrubland on loamy sand) suggests that the species may be present in some areas.

Extent of potential habitat within the survey area: Sand plains, sand dunes, clay loam plains and sand loam plains (5,047 ha – 84.4% of total area).

Southern Marsupial Mole *Notoryctes typhlops*

Status and Distribution: Listed as Priority 4 by the DPaW. It should also be noted that the conservation status of the southern marsupial mole has very recently been downgraded at a state level and federal level from Endangered (a threatened species considered to be facing a very high risk of extinction in the wild) to Priority 4 (rare, near threatened or other species in need of monitoring) (DPaW 2015a). The downgrading is presumably in response to a recommendation made in the recently published Action Plan for Australian Mammals (Woinarski *et al.* 2014) where the species is rated as “least concern” and a recommendation made for its Endangered status to be “downlisted to a lower category”. This recommendation was justified by “recent surveys using novel techniques having shown the species to be widespread and relatively common”.

The southern marsupial mole is widely distributed throughout the arid areas of central Australia, mainly in the central deserts of the Northern Territory, Western Australia and South Australia (Burbidge *et al.* 1988). These regions include the

Great Sandy, Little Sandy, Gibson, Tanami, Great Victoria and western Simpson Deserts. Recent survey work suggests they are more widespread and common than currently suspected (Van Dyck & Strahan 2008).

Habitat: Deep loose sand appears to be a requirement for the southern marsupial mole and the species is most often recorded in sandy dunes with various *Acacias* and other shrubs (Corbett 1975, Johnson & Walton 1989). Such habitat is widespread and typical of the sandy deserts. The southern marsupial mole may also occur in some sandy plains, and might also occupy sandy river flats, especially in areas where aeolian dunes also occur (Benshemesh 2004).

Likely presence in survey area: The distinctive backfilled burrows of this species were found in the walls of a temporary holding dam constructed on a sand dune in the extreme northern section of the proposed Yeo Borefield, north of the Great Central Road (Figure 2), confirming this species presence at this particular area. This area of dunes appears to be separate from those in other sections of Yamarna (e.g. Gruyere mine area) where no evidence of the species has been found despite targeted searches (i.e. trenches and examination of large cutting in dunes) (Harewood 2015a).

Extent of potential habitat within the survey area: Sand dunes in the northern section of western borefield, mainly north of the Great Central Road (33 ha – ~0.6% of total area).

Sandhill Dunnart *Sminthopsis psammophila*

Status and Distribution: The sandhill dunnart is listed as Schedule 2 under the *WC Act* and as Endangered under the *EPBC Act*. The species is known from a limited number of locations including southern Northern Territory, South West Great Victoria Desert (Including Queen Victoria Springs Nature Reserve), Yellabinna sand dunes in Central South Australia and the Eyre Peninsula in South Australia (Menkhorst and Knight 2011). In Western Australia the species appears to be restricted to the south western fringe of the Great Victoria Desert inhabiting yellow sand dune systems with long unburnt mature hummock grasslands (*Triodia* sp.) and often in association with Mallee or Marble Gum, *Callitris* and an associated complex shrub understorey (GHD 2010, Churchill 2009, DPaW 2015b).

Sandhill dunnarts in Western Australia have been captured in Queen Victoria Springs, (Pearson and Robinson, 1990) and near Mulga Rock in the Great Victoria Desert (Hart and Kitchener 1986) and in the Plumridge Nature Reserve (ecologia 2009). The sandhill dunnart has also recently been recorded at several locations along the Tropicana to Sunrise Dam pipeline route (KEC 2014).

Habitat: A variety of sandy habitats usually with sand dunes and an understorey of *Triodea* spp. hummock grass. Overstorey vegetation can vary but in Great Victoria

region most often associated with low open *Eucalyptus* and *Callitris* woodlands (Van Dyck & Strahan 2008). Low parallel sand dunes carrying open woodland with diverse low shrub layer and hummock grass (Menkhorst and Knight 2011). Long unburnt spinifex sandplain between yellow sand dunes (KEC 2014).

Likely presence in survey area: No evidence of this species presence was observed during the field survey or any previous survey at Yamarna including those where trapping has been employed (KLA 2012 and Rapallo 2015). This species optimum habitat in the Great Victoria Desert area is yellow sand dune systems with long unburnt mature hummock grasslands (*Triodia* sp.). This habitat appears to be absent from the survey area and therefore it is not considered a potential species.

Extent of potential habitat within the survey area: No suitable habitat (yellow sand dune systems with long unburnt mature hummock grasslands (*Triodia* sp.)) for this species appears to be present.

Bilby *Macrotis lagotis*

Status and Distribution: The bilby is listed as Schedule 3 under the *WC Act* and as Vulnerable under the *EPBC Act*. Current known distribution in suitable habitat extends from Tanami Desert west to near Broome and south to Warburton. Former distribution extended south to Margaret River, though apparently absent from coastal plain (Burbidge 2004).

Habitat: Current habitat includes *Acacia* shrublands, spinifex and hummock grassland (Menkhorst and Knight 2011). Mitchell grass and stony downs country if cracking clay, also desert sand plains and dune fields sometimes with spinifex hummock grassland and acacia shrubland (Van Dyck *et al.* 2013).

Likely presence in survey area: Not recorded during any recent surveys at or near Laverton, Yamarna or Tropicana (ecologia 2009, TE 2011, KLA 2012, KEC 2014 and Rapallo 2015) and all available evidence suggests this species is locally extinct despite the presence of apparently suitable habitat.

Not listed as a potential species based on currently available information.

Extent of potential habitat within the survey area: Sand plains, sand dunes, quartz rocky plains, clay loam plains, sand loam plains and drainage depressions (5,717 ha - ~95.6% of total area).

Central Long-eared Bat *Nyctophilus major tor*

Status and Distribution: Listed as Priority 4 by DPaW. Historical distribution included the Coolgardie, Hampton and northern Avon Bioregions in Western Australia, Gawler Bioregion and western part of the 'Eyre and York Blocks' Bioregion

in South Australia. A specimen from Ooldea in the Great Victoria Desert Bioregion of South Australia. One other specimen from a car grill after a night-time drive from Marla (Stony Plains Bioregion of SA) to Alice Springs in the Northern Territory via the Stuart Highway in c.1985. No historical data on abundance.

Up until last decade this species was only known from 15 localities in Western Australia and 19 in South Australia. No evidence that range has contracted, but it is apparently rare in Great Victoria Desert, Nullarbor and Stony Plains Bioregions while it is locally common in Coolgardie, Hampton, Gawler and western Eyre-York Block Bioregions (Duncan *et al.* (ed) 1999).

Habitat: Gleans ground, bark and foliage surfaces; forages in and against cluttered airspaces. The species is often netted, and sometimes caught in pit traps, in heavy eucalypt woodlands and tall woodlands of the Coolgardie Bioregion of Western Australia with a tall shrub understorey of *Melaleuca lanceolata*, *M. pauperiflora*, *M. quadrifaria*, *Eremophila spp.* etc. Less common in open woodlands. Has been netted at dams in the Coolgardie and Hampton Bioregions of Western Australia while in South Australia has been associated with a range of mallee (*Eucalyptus*) species, *Acacia papyrocarpa*, *A. ramulosa*, *Casuarina cristata* and found to the fringes of the treeless Nullarbor Plain (Duncan *et al* (ed) 1999). Roosts in tree cavities, in foliage and under loose bark (Churchill 2008).

Likely presence in survey area: Possibly recorded within the Gruyere Project area but the calls of a closely related species could not be separated in this instance (Rapallo 2015). Recorded at Tropicana (ecologica 2009) but not further west or north west (TE 2011, KEC 2014) despite the presence of apparently suitable habitat.

Some doubt about this species status in the area but not listed as a potential species based on available information.

Extent of potential habitat within the survey area: Sand plains, sand dunes, clay loam plains, sand loam plains, closed depressions, drainage depressions and quartz rocky plains (5,983 ha – 100% of total area). Requires tree hollows, foliage and loose bark for roosting (Churchill 2008) microhabitats that maybe absent from some areas.

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